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ECIE 2021

Hosted By

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Instituto Universitário de Lisboa, Portugal

16-17 September 2021

Edited by
Dr. Florinda Matos, Prof Maria de Fátima Ferreiro, Prof Álvaro Rosa and Prof Isabel Salavisa

Review Process
Papers submitted to this conference have been double-blind peer reviewed before final acceptance to the conference. Initially, abstracts were reviewed for relevance and accessibility and successful authors were invited to submit full papers. Many thanks to the reviewers who helped ensure the quality of all the submissions.

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ECIE Preface

These proceedings represent the work of contributors to the 16th European Conference on Innovation and Entrepreneurship (ECIE 2021), hosted by ISCTE Business School, Instituto Universitário de Lisboa, Portugal on 16-17 September 2021. The Conference Chair is Dr. Florinda Matos and the Programme Co-Chairs are Prof Maria de Fátima Ferreiro, Prof Álvaro Rosoi and Prof Isabel Salavisa all from Instituto Universitário de Lisboa, Portugal.

ECIE is a well-established event on the academic research calendar and now in its 16th year, the key aim remains the opportunity for participants to share ideas and meet the people who hold them. The conference was due to be held at Instituto Universitário de Lisboa, Portugal, but due to the global Covid-19 pandemic it was moved online to be held as a virtual event. The scope of papers will ensure an interesting two days. The subjects covered illustrate the wide range of topics that fall into this important and ever-growing area of research.

The keynote presentation is given by Soumodip Sarkar, Vice-Rector, from University of Évora, Portugal on the topic of Social Intelligence. The second day of the conference will open with an address by Professor Vittorio Loreto, Sapienza University of Rome, Italy, who will talk about Exploring the adjacent possible: play, anticipation, surprise.

With an initial submission of 269 abstracts, after the double blind, peer review process there are 131 Academic research papers, 18 PhD research papers, 4 Masters Research papers and 4 work-in-progress papers published in these Conference Proceedings. These papers represent research from Bahrain, Brazil, Cambodia, Canada, China, Columbia, Croatia, Cyprus, Czech Republic, Denmark, Eesti, Egypt, Estonia, Finland, Germany, Ghana, Greece, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Kuwait, Lithuania, México, Norway, Oman, Perú, Poland, Portugal, Qatar, Republic of Ireland, România, Russia, Russian Federation, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, Thailand, The Netherlands, Turkey, UAE, UK and USA.

We hope you enjoy the conference.

Dr. Florinda Matos

Instituto Universitário de Lisboa
Portugal
September 2021

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Biographies

Conference and Programme Chairs

Dr. Florinda Matos is the founder and the president of ICAA - Intellectual Capital Association. She holds a PhD in Social Sciences, Organizational Behaviour Studies from the University of Lisbon (Portugal). She teaches in graduate and post-graduate courses at ISCTE – Instituto Universitário de Lisboa and in several other higher education institutions. She is an associate research fellow of DINÂMIA'CET-IUL - Centre for Socioeconomic and Territorial Studies. Currently, she is leading the project "KM3D - Knowledge Management in Additive Manufacturing: Designing New Business Models". She is a member of the New Club of Paris. As a Knowledge Management expert, she is the ambassador for Europe of the International Conference on Knowledge and Innovation (CIKI) and member of the Observatory on Knowledge Management and Innovation in Public Administration, from IPEA - Institute for Applied Economic Research of Brazilian Government. She has more than 30 published academic articles and scientific papers, book chapters and books. Her main research interests are Intellectual Capital, Knowledge Management, Digital transformation and Sustainability.

Prof Maria de Fátima Ferreiro is Associate Professor with Habilitation at Iscte - Instituto Universitário de Lisboa, in Lisbon. Her research is conducted at DINAMIA'CET-Iscte, Centre for Socioeconomic and Territorial Studies, in the subjects of territory, food system and transitions towards sustainability, and social innovation. Currently the research is developed within the European Project RurAction, Social Innovation and Entrepreneurship in Rural Regions, funding by the European Union's Horizon 2020 Research and Innovation Programme under the Marie Sklodowska-Curie grant agreement; and project SPLACH - Spatial Planning for Change (2017-2020) – funded by Compete 2020. Teaching activity in the areas of economic ideas, territory, and sustainability. Publications in the areas of social innovation, territory and governance, food system and transitions towards sustainability. Supervision of master and PhD thesis. Referee of indexed national and international journals. Dean of the School of Social Sciences and previous director of the Department of Political Economy at Iscte

Prof Álvaro Rosa is associate professor (with Habilitation) at ISCTE Business School. Currently is the director of the Master of International Management at Iscte - Instituto Universitário de Lisboa and member of Scientific Committee of Iscte Doctoral Programme on Applied Management. His research interests are strategy, qaulity and cross-cultural management. He is a regular visiting scholar in faculties in China, Brazil, UK, and Slovenia.

Prof Isabel Salavisa is Full Professor of Economics at Iscte - Instituto Universitário de Lisboa, in Lisbon. Her research is conducted at DINAMIA'CET-Iscte, Centre for Socioeconomic and Territorial Studies, of which she has been Director (2004-2013) and is joint coordinator of the Research Group 'Innovation and Labour'. She has been working on the research project SPLACH - Spatial Planning for Change (2017-2020) – funded by Compete 2020. She is advisor to the Jean Monet Centre of Excellence on "Labour, Welfare and Social Rights in Europe" (2018-2021). Her research subjects comprise economics of innovation; sustainability transitions of large sociotechnical systems, such as energy and food; and Welfare State policies in Europe. She coordinated and participated in a large number of projects. She wrote, edited and contributed to a number of books, published articles and presented papers at a great deal of conferences. She has supervised PhD. dissertations and taught mostly Economics of Innovation, Economics and Policies of the EU, and Sustainability Policies. She is a member of international associations and networks and referee of several international journals.

Keynote Speakers

Vittorio Loreto is a Full Professor of Physics of Complex Systems at Sapienza University of Rome and the Faculty of the Complexity Science Hub Vienna. He is currently directing the SONY Computer Science Lab in Paris where he also leads the team on "Innovation, Creativity and Artificial Intelligence". His scientific activity is mainly focused on the statistical physics of complex systems and its interdisciplinary applications. He coordinated several project at both EU and Italian levels. More recently he coordinated the Templeton-funded KREYON project devoted to unfolding the dynamics of innovation and creativity. Loreto has published over 180 papers in internationally refereed journals and conference proceedings and chaired several workshops and conferences. He is member of the executive committee of the Complex Systems Society.

Soumodip Sarkar is the Vice-Rector of the University of Évora, Portugal. He is a Full Professor at the Department of Management, University of Évora, Portugal and a researcher at CEFAGE-UE. He is currently also a Non-resident Fellow of the Asia Center at Harvard University. Prof. Sarkar was the first Dean of the pioneering Doctoral School in the country (2010-2014). He is also the executive president of the Science Park of the region (PACT). His current research interests include innovation (especially related to implications of AI, and the rise of China), entrepreneurship and sustainability. His recent research has been published in high impact journals. He has published four books on entrepreneurship and innovation, and his most recent book, EntreSutra was published by Bloomsbury in April 2019. He has been featured in national and international media, including the Economist and BBC.

Mini Track Chairs

Dr Nasser Abouzakhar is the director of Anzar Property Group which was founded in 2017. Between 2004 and 2019, he worked at different universities in the UK as an academic, teaching and researching different technology-related subjects. He has a good understanding of the property investment business and finances. Nasser has firm relationships with professionals in banking, legal, accounting, and valuation which assist with his responsibility as the company director. He leads a highly professional and experienced management team.

Dr Nikolaos Apostolopoulos, PhD, is an Assistant Professor in Entrepreneurship and Innovation at Neapolis University Pafos. He also acts as a Scientific Advisor at the Labour Institute (INE-GSEE). Moreover, he is a key researcher of the Jean Monnet Centre of Excellence on Governance at the University of Peloponnese. He is co-editor of the edited volume entitled Universities and Entrepreneurship: Meeting the Educational and Social Challenges and the edited volume entitled Entrepreneurship and the Sustainable Development Goals.

Fraser Bruce is a senior design academic at the University of Dundee with over 20 years of teaching, research and consultancy experience. He is currently the Programme Director for the MSc Product Design course where he delivers specialist lectures and workshops on design thinking, service design and innovation. His research interests lie in the integration of biomimetic design with the practice of product design and innovation management. He has also

conducted research that explores the impact of digital technologies and the use of big data in the creative industries.

Dr Alexandros Kakouris, MsC, PhD, is an adjunct lecturer in entrepreneurship and innovation at the University of Peloponnese, at the Hellenic Open University and at the National and Kapodistrian University of Athens. He holds PhD in Physics, PhD in Entrepreneurship and a MSc in Adult Education. His special interest concerns fostering entrepreneurship and innovation to science graduates and the support of youth entrepreneurship through teaching and counselling as well as nascent entrepreneurship, transformative and experiential learning.

Sharifa Latter is lecturer and Programme Director of the interdisciplinary MSc Design for Business at the University of Dundee. Her industry experience in business and marketing includes positions held in account management, project and campaign management for international brands in various industries. Her research in this field focuses on the exploration of user/customer-centric innovation as well as consumers' attachments and interactions with design solutions throughout product lifecycles.

Dr Ruslan Pavlov is a senior researcher at the Central Economics and Mathematics Institute of the Russian Academy of Sciences, and post graduated from the same institution. His research interests include the diversification of business and big cycles, as well as the social responsibility of business and social entrepreneurship.

Professor Cezar Scarlat is with the Department of Entrepreneurship & Management and PhD supervisor at Doctoral School of Entrepreneurship, Business Engineering & Management from University "Politehnica" of Bucharest. He is currently teaching Technology Entrepreneurship and related courses at universities in Romania and abroad. Cezar holds a Master degrees in Engineering and International business, PhD degree in Management & industrial engineering. He has over two-decade-experience in business management consulting and international projects. Cezar has published more than twenty books and about two hundred scientific reports and articles. He is a member of professional organizations and scientific/editorial boards of academic publishers and international journals (IMDS, ESWA, ABSRJ among others).

Dr Andreas Walmsley, PhD, is Associate Professor in Entrepreneurship at the International Centre for Transformational Entrepreneurship, Coventry University. He conducts research in entrepreneurship, especially entrepreneurship education, graduate entrepreneurship and responsible entrepreneurship. He is on the editorial boards of the journals Entrepreneurship Education and Pedagogy and the International Journal of Entrepreneurial Behaviour and Research.

Dr Birgitte Wraae, PhD, is an Associate Professor in Entrepreneurship at the Faculty of Business and Technology and the Department of Applied Business Research at UCL University College Denmark. Her research interests are in entrepreneurship, especially entrepreneurship education: identity formation, emancipation, and employability. She excels in doing research in connection with the entrepreneurial learning space. She is the co-developer of Teachers Games that puts entrepreneurial learning approaches into practice.

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Nasser Abouzakhar is the director of Anzar Property Investors Limited which was founded in 2017 and author of Real Estate Investment book. Between 2000-2019, he worked at different universities in the UK as an academic. Nasser has a good understanding of property investment and finance and developed firm relationships with stakeholders in banking, legal, and accounting."

Emma Agusita is Senior Lecturer in Digital and Cultural Production and in Media Culture and Communications at University West England. Emma's previous research includes work on the Creative Citizen's research project, a multi-institution project funded by the RCUK Connected Communities scheme.

Noora Albastiki believes that investing in students today will ensure the prosperity of the leaders of the future. Noora is a member of the Ministry of education in the Kingdom of Bahrain for 9 years as a developer of career guidance programs for technical and vocational students.

Susana Aldeia is a full-time Assistant Professor at the ISAG/EBS European Business School. She holds a Phd in Taxation and a DEA from the Vigo University (Spain) in Tax Law; a postgraduation in Taxation from the IPCA and a degree in Accounting, also from the IPCA.

Mariam Hareb Humaid Belhaymah Aldhaheri , CFP,CFI, CFT, AFHEA. Over 15 years of experience in financial services, academic and consulting. Dr. Mariam brings a wealth of expertise with particular strengths in areas such Corporate Strategic planning, Future Foresight, Innovation and Entrepreneurship.

Rui Alves Attending the PHD course in Informatics at the university of Minho, Rui Alves is currently a programmer and Software Tester at the company Techwelf and in parallel is a visiting teacher at the Polytechnic Institute of Bragança. Passionate about knowledge, Rui Alves loves to create new ideas to solve everyday common problems.

Maher Alzyadat is a PhD student in Engineering Management, Department of electronic engineering at the University of York, UK. He holds an MSC in Engineering management, His main research areas are Intrapreneurship and innovation in technology SMEs.

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Paula Anzola-Román is an Assistant Professor from the Public University of Navarre with PhD in Economics, Business Science and Law. Her research interest is in the field of innovation management. More recently, her work has focused on developing and studying entrepreneurship.

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Mr Olusegun Matthew Awotunde is a PhD candidate at the University of KwaZulu-Natal, South Africa. He is a team member of the SHAPE research lab. His research focus includes human capital and youth entrepreneurship development through action learning.

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Negalegn A. Bekele studied MSC in Industrial Engineering at Addis Ababa University, Ethiopia in 2011. From 2011-2019, he worked as a lecturer and researcher at Debre Markos University, Ethiopia. Currently, he is working as full-time researcher at Padova University, Italy in the area of consumer Internet of Things and startups.

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Benedetta Diegoli is a 2nd year master student at Catholic University of Milan in Pedagogy and Social Science. During her bachelor education, she studied at the University of Bologna in the course of Educational Sciences. She did research for her thesis project in Sevilla. The thesis insisted on the inclusion of Gipsy culture in the traditions of Andalusia.

Marcin Bielicki – research project manager at Poznan University of Economics and Business (Poland) and Fulbright Fellow from Texas Christian University (USA). His research interests are related to entrepreneurship, including above all business pre-incubation and problem-based learning.

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Volume One

Corporate Social Responsibility Dimensions and Sustainable Entrepreneurship

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Abstract: The topics of entrepreneurship, corporate social responsibility (CSR) and socially committed entrepreneurial strategies are commonly applied in different contexts, however, most of the times there's a lack of consonance and coherence as far as these matters are concerned. According to this statement, this paper aims to provide novel insights focusing on the meaning of the concept 'Social Entrepreneurship' and its connection with CSR. The main intention behind this research is to study the corporate social responsibility dimensions and understand how the researchers in this area have approached this topic on their studies. Furthermore, it also examines evidence regarding the presence of responsible entrepreneurship within the scope of the papers scrutinized. The research used the literature review methodology. The results show that corporate social responsibility literature has been addressing corporate governance, social, and environmental issues. Academics have been paying less attention to the economic dimension. Nevertheless, in the last few years, public attention has been centred on public finances and wealth issues. The economic crisis highlighted aggressive tax practices as irresponsible and illegitimate procedures, thus being inconsistent with CSR. It was possible to observe that research on the topic of sustainable entrepreneurship has been scarce, and it can also be stated that, to our knowledge, little attention has been paid to responsible innovation. However, there are some studies that are able to confirm that this matter was previously approached in the first decade of this century.

Keywords: corporate social responsibility, corporate sustainability, social dimensions, entrepreneurship, sustainable entrepreneurship

1. Introduction

A contemporary business cannot ignore modern consumers' needs, because several studies refer that business activities which are only based on achieving profitability and performance efficiency, regardless of creating social welfare and solving environmental problems, have a tendency to be unsuccessful. For this reason, it is vital and appropriate for business companies and organisations to base their activities on socially responsible actions, regarding social, ecological and ethical (moral) aspects (Aguinis and Glavas, 2012). Researchers have further suggested that CSR involves voluntary activities of companies that exerted positive impacts on society, beyond the interests of the company and what is required by law (McWilliams and Siegel, 2001). According to a recent literature review, most of the definitions of CSR include different dimensions related to ethics, governance, transparency, business relationships, financial return, community involvement, product value, employment practices and environmental protection (Epstein and Schnietz, 2002). Following this premise, companies should adopt a strategic perspective to CSR, which involves identifying the most beneficial strategies because since companies cannot solve all the problems of society, they should focus on the specific social issues which they can successfully handle and leave the remaining to other organisations which are capable of solving them (Porter and Kramer, 2006). According to Carroll (1991) and Woods (1991), employees, customers, shareholders, the environment, society, and investors, who might be affected by the business activities of organisations, should be considered as stakeholders of an organisation. Considering this stakeholder perspective to CSR, it is expected that the interests of stakeholders will be associated with positive financial and economic performances (Tarmuji et al. 2016).

At this point, Latapí, et al (2019) and de la Cuesta, et al, (2015) acknowledge the following CSR dimensions: economic, environmental, social, and governance. In consonance with these authors, the present paper follows this characterization. In this context, we will analyse the CSR dimensions using the most recent literature, thus establishing a relationship with entrepreneurship. This research addresses two objectives in this conceptual background: (1) to establish the CSR dimensions that scholars have been approaching in recent research and (2) to know if these studies also introduce sustainable entrepreneurship concepts.

2. Methodology

In order to answer the objectives, a literature review was made. The review of other authors' work has been used to evaluate several academic and scientific research themes. This kind of review helps in the content

systematization edited by several researchers. Thus, the literature review is typically a qualitative analysis of the research performance (Van Raan, 2003).

The research uses literature collected from several databases, in particular it analyses research from the SCOPUS, Web of Science and Pro-Quest databases, in the last 5 years (2016/2021).

3. Corporate social responsibility dimensions

3.1 Governance dimension

In the last few years, an increasing concern with the concepts of governance and its relation with CSR has been clearly identified in different contexts, mainly related to two pivotal areas: the business corporations' domain and the academic literature production (Thanetsunthorn and Wuthisatian, 2016). In this scope, it is possible to trace a common ground in several of those studies, pointing out that a well-planned system of corporate governance is a crucial element within the context of CSR and sustainable development (Crifo et al., 2018).

Another significant research field, linked to the issues related to social and environmental responsible practices has been gaining burgeoning attention, due to a contemporary trend in this area, which establishes a relation between the need to go beyond corporate financial performance and 'integrate economic, social, and environmental objectives into the core of business activities' (Fiandrino, et al, 2018, p.171). The authors were able to determine three relational models, departing from other similar studies: (1) corporate governance as a pillar of CSR: (2) corporate governance as a dimension of CSR; and (3) corporate governance as part of a continuum (Fiandrino, et al, 2018). The contribution of this research lead to the definition of these three lines of research, thus confirming the decisive role of corporate governance when dealing with CSR practices (Fiandrino, et al, 2018; Rashid, 2018).

The quality of corporate governance practices within specific CSR environments was also addressed in other studies (Cohen, et al, 2017; Tarigan, 2019). According to the conclusions of these researches, it became clear that companies should include CSR strategies and actions to improve their strategic options and assure a powerful and meaningful relationship with their stakeholders (Tarigan, 2019; Salvioni and Gennari, 2019).

The level of influence represented by both institutional and cultural (local) environments is also an extremely significant line of research (El-Bassiouny and El-Bassiouny, 2018; Jian, et al., 2017). Both studies reached similar findings, thus establishing a clear connection between CSR practices and external contexts. On the one hand, institutional environments seem to exert a strong influence in the 'dynamics of interaction between organizational-level variables and CSR' (El-Bassiouny and El-Bassiouny, 2018, p. 116). On the other hand, the different national contexts, considering their social, cultural, economic, and even political backgrounds, are factors that may interfere with the quality of CSR disclosure (Jian, et al, 2017; Thanetsunthorn and Wuthisatian, 2016). In this particular field of research, some studies have also posited that legal systems and political interventions, which are dependent of general conditions that are necessarily different around the globe, are key factors of corporate governance and CSR (Thanetsunthorn and Wuthisatian, 2016). The same study even states that national culture is clearly a critical factor in this area, suggesting that 'countries with a higher level of individualism are more likely to exhibit higher levels of corporate governance performance' (Thanetsunthorn and Wuthisatian, 2016, p. 1443).

The relationship between corporate governance and corporate sustainability has also been a prevailing research focus (Manning, et al., 2019; Crifo, et al., 2018). These studies have been able to conclude that governance factors are 'crucial determinants of the corporate sustainability – corporate performance relationship (Crifo, et al., 2018, p. 1128). On the other hand, the mechanisms usually associated with corporate governance can be pivotal to evaluate corporate sustainability performance levels (Manning, et al., 2019). Sustainability is also correlated to innovation, as stated by Scherer and Voegtlin (2020). In their study, the authors considered several models of corporate governance, insisting on the relevance of innovative governance methods to improve the quality and effectiveness of sustainable practices.

Within the scope of all the contributions mentioned in this section, two main elements can be identified and enhanced, due to the wide consensus they have generated: (1) companies can no longer ignore the crucial importance derived from the synergies and interrelationships between corporate governance and CSR

strategies; and (2) social and environmental practices have to be integrated in the core management processes of those companies (Fiandrino, et al. 2018).

3.2 Social dimension

All the definitions of Social Responsibility include economic, social, environmental and labour concerns, thus justifying and validating the existence of this concept, which generates benefits for all the parties involved. The CRS practices usually foster the development of companies and businesses, namely in the current competitive markets. Back in the 70's, Carroll (1979) suggested a model with four perspectives: economic, legal, ethical and social. The economic responsibility implies a capitalist society, where all the bodies and organizations actively participate in the economic development. This perspective is connected with a more efficient management, mainly focused on profits. Concerning legal responsibility, businesses develop their activities in accordance to codes and laws that govern societies. This responsibility assures higher ethical and moral standards. These actions may lead to a better financial performance and an increasing level of credibility (Pereira, et al, 2020).

Organizations that carry out socially responsible practices are a major contribution for the decrease of social inequalities (Galvão et al, 2019). Personal values are expressed by the individuals and are socially influenced by the context in which they live, thus interfering with the way they act and behave, which will be the referential standards that influence the way we interact with the society. This, in turn, will undoubtedly shape the type of approach of CSR practices (Bondy and Starkey, 2014). Nowadays, companies, apart from their economic goals, are trying to achieve social objectives, as well as taking care of the environment (triple bottom line). Consequently, CSR is, today, a tool that allows the creation of value to companies (Moreno, 2011).

From 2000 onwards, the concepts of sustainable development and sustainability have been developed and have assumed the dimension of worldwide scale discussion issues (Carroll and Shabana, 2010). Other concepts and models also arose, such as the two-dimensional model of Quazi and O'Brien (2000), in this particular case focusing on the dimensions related not only to companies but also to the whole society. The orientation of CSR is therefore defined as the individual's guidelines in terms of economic, legal, ethical and philanthropic actions in the scope of a specific organization. This process targets the individual's decisions in the context of the company's CSR actions, thus broadening the understanding of the social role played by organizations (Pereira, et al, 2020).

The true essence of CSR means that the added value of a company necessarily implies the creation of benefits for the stakeholders, but it should also determine a positive impact for the environment, for the community, the collaborators, and society in general, thus acting under ethical principles and transparency.

3.3 Economic dimension

In recent years, different interest groups have recognised the importance of CSR's economic dimension. Initially, some studies related this topic to the generation of financial and market value from the investor's point of view (Eccles, et al, 2011; Galbreath, 2013; Ioannou and Serafeim, 2012; Renneboog, et al, 2008). Other studies have also related it not only with the generation of financial and market value from the investor point of view, but also with risk management and corporate governance practices (Galant and Cadez, 2017; Lopez-Arceiz, et al, 2018; Karagiorgos, 2010; Nikolaou, et al, 2019; Alvarez, et al, 2015; Searcy, 2012).

More recently, the global reporting Initiative (GRI) has introduced this concept and defines this dimension as the economic value generated and distributed by the different interest groups (Michelon, et al, 2015; Nielsen and Thomsen, 2007). Lastly, recent studies recognize the taxation as the more relevant thematic on the economic dimension (De la Cuesta-González and Pardo, 2019; de la Cuesta González et al. (2015) analysed the importance of the economic dimension within CSR. The study identifies the 17 most valued indicators for reporting CSR that comply with the materiality criterion, taking into account the interests of companies and interest groups. Within the economic dimension, it identifies three indicators: (1) Sum of all the taxes paid, (2) Total wage expenses (3) Total of subsidies received. The study concludes that the fiscal issue was considered the most relevant. Another study (De la Cuesta-González and Pardo, 2019) looked at what it meant to be more fiscally responsible, from a CSR point of view for different interest groups. The study concluded that investors have been giving more importance to more responsible corporate tax practices.

3.4 Environmental dimension

According to Jintao, *et al* (2020), in the analysis of the environmental dimension, it has been noticed that it is related to corporate responsibility, which forces companies to follow the requirements of environmental protection regulations. At the same time, corporate responsibility encourages managers to develop environmental policies in the organisation, avoid ecological risk related to the process of goods/services production/provision, aiming at minimizing the damage to the environment created by a company, thus preferring environmentally friendly technologies, pollution reduction and prevention.

Many researches demonstrate that a socially responsible company should draw attention to its environment, workers and stakeholders because it is important for a company to ensure the well-being of its employees, assuring competitive wages that correspond to the norms imposed by the laws (Engert and Baumgartner, 2016).

Some research shows that the most important factor of socially responsible companies is the environmental effect. When discussing consumers, it is appropriate for a company to provide qualitative services and sell qualitative goods in order to form a positive impression regarding consumer shopping patterns. Other researchers have determined that a socially responsible company takes into consideration the surrounding environment (Cahan et al., 2016). A business that controls the effect of its implemented activities on the environment and encouraging sustainable use of resources, contributes to the tendency of sustainable development of society. Some authors refer that when analysing corporate social responsibility, socially responsible business organisations create certain benefits for a company that are related to the organisation's interest groups (Maldonado-Guzman et al., 2017; Romani et al., 2016).

The study "Identifying environmental and economic development factors in sustainable entrepreneurship over time by partial least squares (PLS)" (Ismael et al., 2020), was conducted with data collected from 50 countries worldwide with different levels of economic, environmental and social development. The evidence collected allowed us to understand that Sustainable Development Goals (SDG) can help the companies to guide their cooperation actions and investments by credits, subsidies and aid in those SDG that are positive and significant (Ismael et al., 2020). They could empower long-lasting sustainable entrepreneurship, thus providing quality jobs, economic growth and social well-being by following the proposal of identifying those SDG, which are strategic for this purpose, allowing a positive effect on long-term entrepreneurship. It would also be positive for those entrepreneurs to seek guidance for their business in SDG because this would allow them to know which sectors linked with environmental and economic SDG are more related to the companies' survival (Ismael et al., 2020).

4. Sustainable entrepreneurship

From the perspective of sustainable entrepreneurship, it is possible to confirm that there is a concern about environmental, social and economic issues. This entrepreneurship stream has values and a vision that are addressing the future, in which operations are performed for a sustainable purpose (Jahanshahi, *et al.,* 2018). Sustainable entrepreneurship aspires to create viable market solutions and to act as change agents who realize and exploit opportunities for sustainable development. To achieve such ambitious sustainable development gains, sustainability entrepreneurship offers market-oriented solutions to counteract environmental degradation and rectify social injustice and inequality (Belz and Binder, 2017; Binder, 2017; Farny, 2016). It reflects a recent turn in management and organisation research to take a more holistic perspective on the role of business in today's society.

Following the perspective of CSR, Eleni (2019) refers that sustainable entrepreneurship merges the sustainability concept with entrepreneurial activity because it focuses on preserving nature, life support and community welfare by searching for opportunities in the environment/market to develop products and services with or without economic gains. In this context, Khan (2015) determines that sustainability can be analysed through economic, social and environmental factors. Economic factors involve indicators related to employment, increasing sales, income stability and profitability; Social factors involve measures related to basic needs, social recognition, empowerment, freedom, control, child labour and environmental factors collect elements related to water and energy use, waste and emissions, waste management, space management and hygiene (Khan, 2015).

5. Conclusions

The paper's objectives are related to the identification of the CSR dimensions that are being considered and studied by scholars, and to determine if these studies are establishing a direct connection with the sustainable entrepreneurship's concept. The results show that the less researched topic has been the economic dimension, considering that only four studies have address this particular issue. In the last few years, these scholars have related this issue with taxation, considering it as the more relevant element in the economic domain. Sustainable entrepreneurship has also been an understudied dimension, due to the scarcity of studies articles dealing with this topic.

As far as the governance dimension is concerned, a clear research trend could be identified among all the bibliographical contributions included in the present paper, which is related to the need to develop the promotion of CSR governance strategies, thus increasing the level of competitiveness of the companies. Another undisputed implication within this precise context posits the importance of the institutional context of each company, which tends to operate under different assumptions and organizational backgrounds. The governance dimension is also widely considered in the scope of investment decision processes, thus stressing that these crucial and ultimately decisive strategies are influenced by the levels of corporate governance quality.

Finally, the governance dimension is also linked to the specific characteristics of the cultural contexts and their respective social environments, which are closely related to the quality and effectiveness of CSR disclosure.

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Portuguese tax Benefits to Promote Business Entrepreneurship

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Abstract: This paper's primary goal is to understand fiscal policy's role as an inductor of companies' innovative activities. In particular, it understands what kind of tax benefits the Portuguese tax legislator predicts to promote business entrepreneurship. For this purpose, Portuguese tax dispositions were investigated, as was the case of the Corporate Tax Law, the Tax Benefits Code, The Investment Tax Code, and other secondary legal dispositions. Companies can advantage several tax figures that allow the tax burden to decrease. They are the case of contractual tax benefits to productive investment, the investment support tax regime, extraordinary tax credit for investments, the system of fiscal incentives in research and development, the deduction for retained and reinvested profits, extraordinary investment tax benefits. In this dimension, most tax benefits have direct implications in the corporate tax determination, and in concrete, it can reduce the entities' taxable basis or an immediate decrease in the payable tax. These incentives can comprise the tangible and intangible asset's investment.

Keywords: tourism, business, competitiveness, the start of activity, companies, entrepreneurship

1. Introduction

Audretsch et al. (2015) claim that the policy to promote entrepreneurship has a central role in the strategic management of cities because innovation based on knowledge is the key to competitiveness. Thus, it is determined by creating new insight that demonstrates the existence of capacity to business absorption to explore it (Acs et al., 2013).

Still, it is recognized the relevant role of tax policy in innovation's incentive, it has effects in several domains as entrepreneurship, research and development, and technology transfer (Hanusch, Chakraborty, & Khurana, 2017). The European Union has been reinforcing this function several times in the last decades. The economic block, represented by the European Commission, has been complaining about the relevance of a tax system oriented to the States' development and growth (Council of the European Union, 2009; European Comission, 2010, 2016). European Comission (2016) recognizes fiscal policies influence the business' performance and increase companies' opportunities. Thus, it is highly recommended governments pay attention to fiscal issues and tax bonuses for entrepreneurs' companies.

This paper is composed of four sections: first, the introduction, it refers to the matter relevance; the second section presents the entrepreneurship conceptual framework and its relationship with taxation; the third topic identifies the tax benefits that innovative Portuguese companies can benefit. And finally, it gives the conclusions and limitations.

2. Tax benefits as an instrument to promote the companies' entrepreneurship

Entrepreneurship is considered the recognition process of opportunities that allows understanding the potential of a new idea or invention (Shane, 2007). It permits to convert the intellectual capital in a business that creates value through innovation (Shane, 2007). Several studies have demonstrated that this trend is a relevant factor that stimulates the knowledge base of several economies. It happens through knowledge dissemination. Researchers also demonstrate the direct relationship with uncertainty (Packard et al. 2017). The entrepreneurship concept is seen as a process by which an individual recognizes an opportunity considering controllable and uncontrollable resources (Bygrave & Zacharakis, 2011). Thus, entrepreneurial motivation is also

vital for creating and growing new enterprises (Kuratko & Hodgetts, 2007; Delmar & Wiklund, 2008; Marques et al., 2013; Malebana & Nieuwenhuizen, 2015). It allows determining the entrepreneurs' decisions regarding the research, evaluation and exploration of new opportunities (Shane et al., 2003). Spillovers' effectiveness concerning knowledge and entrepreneurship has often been suggested as dependent on factors as (1) politics, (2) the business strategy factors, where the startup strategy is also inserted (Huggins & Williams, 2011), and (3) cluster public policy (Porter, 1998; Audretsch et al., 2018). Nevertheless, the relevance to the emergence of new entrepreneurs in the countries' urban economic development is also essential to support cultural (Qian & Liu, 2018) and social entrepreneurship (Simón et al., 2016). The promotion of it in the business environment of small and medium companies helps to avoid the unemployment threat in society (Tendai et al., 2019).

Several studies have been demonstrating that there is a relationship between tax benefits and entrepreneurship. Some entities have been potentiating the creation of specific programs to help to introduce entrepreneurial projects. So, it is why States' Legislators are interested in promoting tax incentives to increase business activity and, in consequence, employment. Tax law predicts the extrataxation, it represents extra-fiscal taxes that have has goal the orientation of taxpayers behaviours (Dourado, 2019; Gutiérrez, 2003). Tax benefits are tax relief that introduces exceptions to tax incidence, and they proceed with non-fiscal goals (Lapatza, Fernández, & Márquez, 2013; Parada, 2015).

Nevertheless, the tax structure development is a hard task to jurisdictions (Baliamoune-Lutz & Garello, 2014). The governmental institutions face a dilemma in the decision-making process related to the tax rates and benefits. It happens because States need to collect taxes to support public spending and, simultaneously, they need to increase economic growth (Leea & Gordon, 2005). Some studies demonstrate that the tax system affects business decisions, and sometimes it taxes entrepreneurial ideas of success disproportionately with higher tax rates (Gentry & Hubbard, 2000).

Wen and Gordon (2014) They consider that the fiscal progression also influences the choice of professional between the autonomous or employed job. This evidence also shows that the person's career decisions are influenced by the existence of tax benefits to leverage opportunity costs and new entrepreneur business. Literature has been paying attention to issues like taxation, tax policy and business activity due to their relevance.

3. Methodology

This research aims to understand what sort of fiscal benefits the Portuguese policymaker determines to promote business innovation. For this purpose, many legal dispositions were researched, in particular, it uses the empirical legal research methodology. Legal research investigates legal policies, the legislations' roles and other types of legal dispositions that regulate society, and it can be qualitative or quantitative (Epstein & King, 2002).

This research uses qualitative legal research because the Portuguese tax law was analysed, in particular, the Corporate Tax Law - *Imposto sobre o Rendimento das Pessoas Coletivas* (IRC), Tax Benefits Code - *Estatuto dos Benefícios Fiscais* (EBF), Investment Tax Code – *Código Fiscal do Investimento* (CFI), and other legal norms.

4. Tax benefits to entrepreneurship

International tax competition and the E.U. recommendations made increase the number of tax benefits available to business. These tax incentives can be exemptions, tax bonuses, tax benefits, or decreased corporate income tax rate. This tendency has been following by several countries, including Portugal.

In the last decades, Portuguese corporations observed the corporate income tax rate decrease under the pretext of increasing international tax competition and capturing foreign investment. The last tax reform of corporate income tax brought the nominal tax rate to the lowest values of all times. This reform was in 2004.

Furthermore, as a Member State of the European Union, Portugal has been following its guidelines, and It has been made available several tax incentives to promote the corporations' performance. Some of them are overall tax bonus that benefits both businesses in general and the startups.

Companies have five tax benefits available that can allow a reduction of the final corporate tax:

- 1. The benefits to productive investment – *Benefícios Fiscais Contratuais ao Investimento* (BFCI).

- 2. Tax Regime of Investment Support – *Regime fiscal de apoio ao investimento* (RFAI).
- 3. Tax crédit extraordinary to the inventment – *Crédito Fiscal extraordinário ao investimento II* (CFEI II)
- 4. Tax deduction per retained and reinvested earnings – *Dedução por lucros retidos e reinvestidos* (DLLR)
- 5. Tax incentive sistem in busisness research and development – Sistema de Incentivos Fiscais em Investigação e Desenvolvimento II (SIFIDE II).

These tax benefits have mainly legal framework the Portuguese Investment Tax Code – *Código Fiscal ao Investimento (*CFI). Table 1 allows understanding how to operate these tax relief. It presents essential information as scope, access limitations, relevant applications, maintenance of investments assets, cumulativeness with other benefits, obligations, fiscal benefit, and limit of deduction in tax value.

Table 1: Essential information

Description/Type	BFCI	RFAI	DLLR	CFEI II	SIFIDE II
Scope	All companies in eligible activities (1)		Only to micro, small and medium-sized companies	All companies	All companies
Access conditions	Organized accounting No debts to fiscal authority and social security The profit isn't calculated by indirect methods				
	Contractual regime Have technical and management skills; Demonstrate a balanced financial situation with a financial autonomy ratio equal to or greater than 20%; Finance the project with their own resources or through external financing corresponding to at least 25% of the eligible costs	Provide the creation of jobs and their maintenance for the period of holding of the capital goods		Do not terminate employment contracts for three years, under the collective dismissal or for the extinction of the job	Have R&D expenses not reimbursed by other lost funds
Relevant applications	New tangible fixed assets, with the exception of: • Land that is not included in projects in the extractive industry sector • Buildings and other constructions not directly linked to the production	The initial investment in a new establishment or increase in the capacity of an existing one, diversification of production or alteration of the production process New tangible fixed assets, with the exception of: Land, except for mining, quarries and similar Construction, acquisition, repairing and building enlargement, except for manufacturing, tourism activities or related to		New assets related to exploration that will start operating by the end of 2021, except: Construction, acquisition, repairing and building enlargement, except for manufacturing, tourism activities	New tangible assets except: - buildings and land

Description/Type	BFCI	RFAI	DLLR	CFEI II	SIFIDE II
	process or essential administrative activities; • Light passenger or mixed vehicles; • Other transport material in an amount that exceeds 20% of the total of relevant applications; • Furniture and comfort or decoration items, except hotel equipment for tourism purposes; • Social facilities; • Other investment goods not related to business	productive and administrative activities light passenger or mixed vehicles furniture and comfort items, except when related to tourism social facilities or others not related to business		or related to productive and administrative activities light passenger or mixed vehicles furniture and comfort items, except when related to tourism social facilities or others not related to business	
	Intangible assets as patents, licenses, know-how or technical knowledge not protected by patent (which cannot exceed 50% of the relevant applications, in the case of IRC taxpayers who do not fall into the category of micro, small and medium-sized companies)	Intangible assets as patents, licenses, know-how – with a limit of 50%		Intangible assets as development project expenses, patents, trademarks or other related	Patent registration or renovation Expenses with R&D audits Expenses with qualified human resources related to R&D or with external R&D Capital participation on R&D institutions or contributions to public or private funds to finance R&D
Maintenance of investment assets	Maintain economic activity and investments in the region for 3 years from the date of completion of the project Maintain a balanced financial	Maintain the assets: - 3 years in SME - 5 years in other companies	Maintain the assets: - 5 years		Maintain the participation in investment funds for 5 years

Description/Type	BFCI	RFAI	DLLR	CFEI II	SIFIDE II
	situation (A.F.≥20%)				
Cumulative	Not cumulative for the same investment except with DLLR	Cumulative for the same applications with DLLR	Cumulative for the same applications with RFAI	Not cumulative	
Obligations	Benefit dossier				
					Innovation National Agency (ANI) declaration
Fiscal Benefit	Tax deduction				
	(2)	North, Center, Alentejo, Açores and Madeira – 25% of the investment up to € 15,000,000 and 10% in surplus Algarve and Lisbon – 10% of investment	10% of retained and reinvested profits, in a maximum of € 12.000.000 of profit retained or reinvested	20% of assets investment realized between 01/07/2020 and 30/06/2021 with € 5.000.000 limit Tax deduction on 2020 or 2021	Base tax deduction: 32,5% Incremental tax deduction: 50% on increased expense when comparing the 2 last year Additional increase: 15% in base tax to SMEs created less than 2 years ago
Limit of deduction in tax amount	100% on the first year 25% to 50% on the next years to existing companies	50% 100% on the first year of the activity or in the next 2 years	25% 50% to micro and small companies	70%	100%

In general, these tax benefits promote the investment in relevant assets that support the companies activities' development. Most of them do not accept the purchase of building, land and passengers' vehicles. The intangible assets investment is well accepted, and the acquisition of patents, licenses or know-how is included in the eligible expenses of these fiscal benefits. The tax bonuses require some conditions, and one of them is the maintenance of the assets allocated to the investment that benefits these legal figures. These legal dispositions demand investment must be held by 3 to 5 years. Companies that take advantage of them need to have a dossier with all information related to the process, in case of Tax Authority inspection, it is relevant to make the proof. These benefits can operate in two ways: reducing the income tax base and a direct decrease in the tax paid.

Campbell, Mitchell, and Rogers (2013) suggest that there is a relationship between the economic freedom of the interveners and entrepreneurship. Academic studies show empirical evidence that the adoption of policies associated with the decrease of taxes favour economic freedom, and consequently the start-ups' creation (Accordino, 2020; Bennett, 2019; Shakya & Plemmons, 2021). In fact, fiscal programmes that favour economic freedom leads to a cost decrease and barriers to the in and out of the agents, so it promotes entrepreneurship and business innovation (Baumol, 1990; Bennett, 2019).

Accordino (2020) analyses the impacts of fiscal policies on entrepreneurship and innovation in Italy, assuming that they can be used to promote macroeconomic stabilization, improve resource allocation, and improve total factor productivity. The study focuses on the country's tax reform, approved by the European Commission, based on tax benefits and tax exemptions. The evidence collected shows a clear relationship between the adoption of these policies, (which result in tax savings) and, among others, the number of investors, amount of investment made by companies, number of start-ups and level of employment.

According to República Portuguesa (2021), in Portugal the maintenance of tax policies based on tax reduction or exemption at company level is based on the results obtained in other countries. They are in line with the global guidelines of the European Commission with a view to stimulating the growth of a European

entrepreneurial ecosystem, through the attraction of more investment and reinforcement of the European presence in the global system.

5. Conclusions

The paper's primary goal is to understand what fiscal benefits the Portuguese lawmaker foresees to stimulate business entrepreneurship. The results show that the Portuguese legislator presents some legal norms that allow innovative companies to reduce corporate income tax and induce the behaviour of economic taxpayers. These benefits consider eligible expenses the purchase of tangible and intangible assets, existing some exclusions such as the building, land, and vehicles of passengers. This study only refers to the Portuguese case study, and this aspect constitutes a research limitation. It could be interesting to compare the tax benefits of Portugal with the other European Union States.

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External Factors Influencing SME's Innovation Outcomes in Visegrad Countries: A Document Analysis

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Abstract: Stimulating innovation has been key in addressing policy challenges facing small and medium scale enterprises (SMEs) in the Visegrad countries. Innovational activities among firms within the Visegrad countries have given firms a competitive advantage. Understanding some factors that influence process and product innovation and their impact are very necessary for deciding on the innovation strategy that leads to successful innovation. The study assesses some external factors that SMEs within Visegrad countries find most detrimental to their innovative activity using document analysis. Twenty-five articles were reviewed from the web of science, Scopus, and Google scholar databases, thus, from 2006 to 2020. The articles revealed the innovation types of SMEs in the Visegrad countries and external factors influencing innovation the most. The document analysis results show that external factors such as spatial and locational, markets for firms' product, public policy, society, and environmental factors are very important for SMEs product and process innovation outcomes. Again, the study not only gives insights into the SME's innovation literature but rather a wake-up call to SME's practitioners and stakeholders on the need to ensure sustainable SME's given the swift growth of innovation across the globe. Limitation and future research directions are presented at the end of the paper.

Keywords: innovation, SMEs, business environment, Visegrad countries, Europe

1. Introduction

In recent times, innovation has become very crucial for small and medium scale enterprises (SMEs). Innovation is considered very important because it increases a firm's profit and market share (Amoah et al., 2021). Newmarket growth and development depend greatly on the firm's innovative activities with its external environment (Li et al., 2020). SMEs are flexible in adapting to change, transforming the new set of ideas into quality market products, developing new technologies, and adopting new production methods and marketing. However, in the Visegrad countries, SMEs face a lot of challenges in conducting their business operations (Hudec, 2015). Establishing innovative businesses depends mainly on the general economy, structural changes, and governmental policies. Governmental solutions aimed at targeting innovative firms within Poland, Czech Republic, Slovakia, and Hungary are often related to internal factors and can result in certain restrictions to their activities (Belas et al., 2020). The competitive advantage is through identifying significant elements in managerial processes and factoring in external factors such as taxation, governmental policies, and an enabling environment (Walicka, 2014).

Digitalization, changes in customer demand, and globalization all imply that the competitive advantage can be temporarily (Hitt et al., 2016). Firms are in keen competition and improving their market performance because of innovation (Odei & Stejskal, 2020). Innovation on the macro level has contributed to economic development and societal growth through job creation for expert scientists and researchers (Odei & Novak, 2020). Thus, it is not surprising that SME innovations are more present in business research and governmental certain across European countries. Innovations differ among SMEs, although they are grouped as innovative and non-innovative firms depending on the risk-taking by management. According to Adamczyk et al. (2012), a different group of innovations is classified according to the degree of innovation, type of innovation, and sustainability. The degree of innovation can be termed incremental, semi-radical, and radical innovations (Davila et al., 2006). Incremental innovations provide a modest return on investment with lower risk and the least resources (Andrews & Criscuolo, 2013). On the other hand, radical innovation offers a greater share of profit margin for firms with huge competitive advantage but demand higher risk levels and huge resource engagement (Maslach, 2016). Semi-radical innovations are an intermediate risk as compared between radical and incremental innovations (Rustler, 2020).

SMEs dominate the Visegrad countries. However, Visegrad countries are weak in financing SMEs and thus face significant challenges on governmental policies such as taxation, overgrown bureaucracy, innovation-friendly environment (Cardoso, 2020; (Belas et al., 2020). While in related literature, SMEs are compelled to hire qualified and competent employees to avoid some bureaucratic regulations and comply with their operational strategies (Amponsah et al., 2020). The main objective of this paper is to find the external factors influencing different types of innovation from the perspective of SME operators within the Visegrad Group. Again, the study will provide an updated and extended investigation of SME innovation outcomes from external sources.

Theoretically, the study would discover and inform researchers on factors that result in successful innovation outcome within the Visegrad countries and their allocative importance in generating innovators in the European Union. Whereas, practically, the study would help structure and customize policy makers' decisions and, consequently, invest in the proposed framework indicators. This will, in the long run, allow policymakers in making informed decisions by correctly allocating resources for a sustainable business venture.

2. Literature review

A company's external environment comprises factors beyond management control (Kraja & Osmani, 2015). Although most of these factors create challenging opportunities for the management of SMEs, they need to consider making strategic choices. Some of these factors include activities of competitors, activities of customers, legal, regulatory framework, taxation, supply of technology, and new ideas value to innovation. Four main elements can influence a business's external environment: Spatial and locational factors, markets, public policy, society, and the natural environment.

Spatial and locational factors: This defines its jurisdiction and proximity to its manufacturers and how close it is to the labour market. These factors can affect the cost of business operation and consumer demand (Cook et al., 2007). The decision of a company to conduct its business operation within or outside a firm will help identify the type of innovation the firm can undertake. In addition, the global value chain of the firm will depend on data on specific business activity conducted on the domestic market or the international market. A firm's location also influences other external factors such as the market that provide how companies exchange goods and services for fulfilling their objectives. Carayannis, et al. (2017), in their article, emphasized that a business's location is considered a key factor contributing to technological innovation. We, therefore, propose that:

Proposition 1*: Spatial and locational factors positively affect SME innovation outcome.*

Markets for firms' products: Competition for products and technological opportunities can directly affect a firm's decision on innovation activities and their investment. Based on United Nations' Central Product Classification (CPC) system, which is the main global reference for all goods and services that provides a concrete framework for international classification on the statistics on goods and services (Frederick, 2014). The CPC identifies a product by its industrial origin, physical properties, and other characteristics such as main economic activities. Again, innovative firms can be classified based on products produced and the method used in production. Companies' coverage of the market is beneficial for discovering new markets and the location of significant competitors in a geographical market. A similar study was conducted by Aksoy (2017), who found that markets are a relevant factor for successful innovation performance. We therefore propose:

Proposition 2: *Market for firms' products can positively influence SME innovation outcome.*

Public Policy: Governmental support programs directly or indirectly affect SMEs' innovation (Radicic et al., 2020). Support from the government can be in the form of funds provided by the European Union. This can be a subsidy on products that promote innovation, such as acquiring new machinery or the outcome of business innovation activities. Innovation activities within the Visegrad countries have to be a significant target of the government as it contributes to regional development and provides the policy framework for government to follow (Ivanová & Čepel, 2018). Both national and international regulations governing members of the Visegrad countries help assess the impact and the level of support for innovation activities. A study conducted by Odei et al. (2020) revealed that public subsidies for innovations from European Union sources boosted innovation activities within Visegrad country's innovation outcomes.

We therefore propose:

Proposition 3*: Public Policy can positively affect SME innovation outcomes.*

Society and the natural environment: this can affect SME business activities directly or indirectly. The aspect of the community that can influence the public embracing innovation and incorporating companies' policies on corporate social responsibility. Major societal changes can drive wide innovations in such a way that will move to a low-carbon economy (Bridge et al., 2013). The result of business activities and product development in the natural environment will help drive business innovation activities because companies are looking to reducing pollution through "green" innovations. Companies are engaging in innovation activities by responding to changes in their natural environment to adapt to climate change. Similar studies were conducted by Dangelico & Pujari (2010) and discovered that integrating green product innovation provides the solution to challenges that firms faced and contributes to an enabling environment. We therefore propose:

Proposition 4*: Societal and natural environment can influence SME's innovation outcome.*

Following the articles reviewed and their corresponding propositions, we conceptualized a framework in figure 1 below:

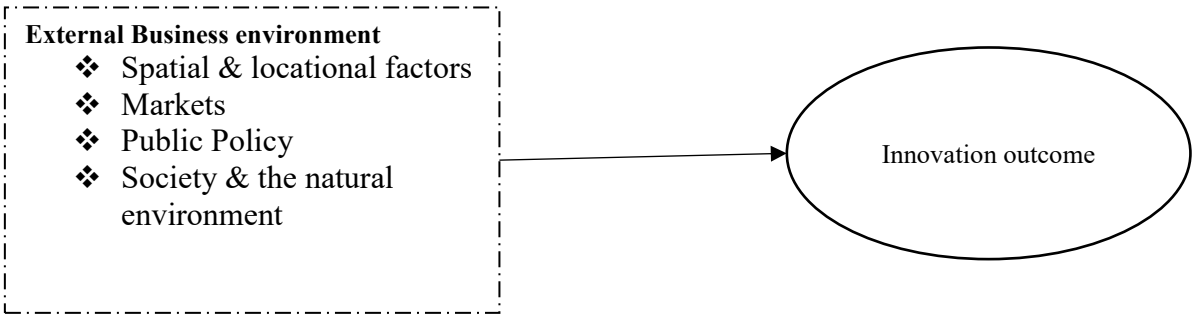

Figure 1: Conceptual model of innovation outcome in the Visegrad Countries. Source: Author's own

3. Methodology

This study is based on qualitative inquiry using document analysis which is the best approach to achieve the aim of this paper. Bowen (2009), defines document analysis as the use of both electronic and printed materials for reviewing and assessing the necessary documents to draw a meaningful conclusion in academic research. This signifies the fact that document analysis provides to readers all the necessary information and sufficient evidence to accomplish the aim of the study (Paulussen, 2016). Authors used keywords such as innovation outcomes, SMEs performance, and Public policy to get sufficient information from Web of Science, Scopus, and Google scholar from the year 2006 to 2020. A total of thirty papers were reviewed to achieve the objective of this study from these databases. All related articles concerning the study were downloaded in English to meet the objective of the study.

Again, authors sought important information from secondary sources such as textbooks and documentaries as part of the method for this study to meet its objective. Other researchers are encouraged to read the work of (Lendel & Varmus, 2011; Talke et al., 2011) by researching a qualitative survey. We have therefore drawn a conceptual framework as part of the objective to meet the theme as shown in figure 1.

4. Theoretical and practical implications

This study adds to the literature on the locational, environmental, market, and public policy factors that result in successful innovation outcome within the Visegrad countries as well as their allocative importance in generating innovators in the European Union. Again, this paper offers ample knowledge for SME operators to supplement resource allocation needs and create an enabling environment for innovation generation. Lastly, it provides the systematic impact of elements that result in patents, design applications, and trademarks within the European Union (EU) and also identifies the essence of these factors in contributing to innovation creation within the European Union.

Practically, the study helps to structure and customize policy makers' decisions and heavily invest in these framework indicators. This will in the long run allow policymakers in making informed decisions by correctly allocating resources. Furthermore, it can grant policymakers a general view of the conversion role of the traditional method of operating a business to technological innovation and align support for these variables in line with new EU programs or objectives.

4.1 Limitations of the paper

This paper could have been broadening through the inclusion of other electronic databases that have relevant information on SMEs innovation outcomes could have been included in the article review. Furthermore, most articles concerning the topic were not accessible in some databases. Thus, we could not factor such articles in this study.

5. Suggestions for future research and conclusions

In conclusion, the objective of the study has shifted our focus to the role played by external factors such as locational, markets of products, public policy, societal and environmental factors that result in technological innovation. The study will help SMEs in the Visegrad countries acquire a competitive advantage over other member states and leap ahead of the intense competition among SME operators. Again, this study assesses the various systematic interdependence between these factors and the government policies aligned in contributing to technological innovation.

Regarding the novelty of this research which reveals domineering variables relevant to generating innovators for the Visegrad countries, future studies should have access to the latest EU data and conduct firm-level analysis and specific country-level analysis on the topic.

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University Spin-Offs: A Case Study on Their Characterization, Challenges and Entrepreneurship Ecosystem

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Abstract: University has moved away from the 'ivory tower' conceptualization that characterized it as an isolated and inexpugnable knowledge fortress. On the contrary, universities fully participate today of a system, acting the main agent for the dissemination of knowledge and technological change, but permeating its borders to be in full contact with its context. Academic literature, noting these transformations, has coined the term 'entrepreneurial university', to refer to this institution that interacts with private companies and other economic agents, exploiting entrepreneurship opportunities, and thus contributing to economic and social development. Within the context of the 'entrepreneurial university', this work focuses on business initiatives arising from academic R&D activities. For this purpose, the research provides a comparative study and a multiple case study based on in-depth interviews with the founding leaders of six firms constituted as spin-offs from the Public University of Navarra (henceforward, UPNA) and other agents related. The objective is to determine a characterization for these types of firms, with the aim of contributing to the literature regarding the phenomenon of university spin-offs and its idiosyncrasy. In turn, this work intends also to identify the main challenges faced by these firms, and to carry out an exploratory study on how the entrepreneurship ecosystem –promoted by the University- helps in overcoming these challenges. In this sense, the results of the analysis highlight the difficulties regarding the need to combine practices to explore disruptive technologies with the need to guarantee a sustainable model for the exploitation of the products developed by these spin-offs. Therefore, this study concludes that the main challenge for university spin-offs is ambidexterity. In addition, it elaborates on the relevance of the support instruments provided by the ecosystem, which intend to complement the initial deficiencies of university spin-offs in matters of management and commercial strategy. This insight is undoubtedly useful for practitioners, researches and policy makers alike.

Keywords: case study, university spin-offs, entrepreneurial ecosystem, entrepreneurship, technology-based companies, ambidexteriry

1. Introduction

University stands as the figure par excellence in charge of the creation and dissemination of knowledge, which constitutes its main purpose (Wright et al., 2004). However, the conception regarding the activities that should embody this mission, have undergone substantial changes in recent decades (e.g., Miller et al. al., 2018; Centobelli et al., 2019). In this sense, the traditional research-teaching binomial has been completed with a third component related to the process of knowledge transfer and economic and social development; i.e., the fostering of innovation and entrepreneurship (Centobelli et al., 2019).

Framed within the context of 'entrepreneurial universities' (Rothaermel et al., 2007; Centobelli et al., 2019), this work focuses on business initiatives arising from academic research results, that is, university spin-offs. In particular, this study adopts a qualitative research approach, and provides a multiple case study based on in-depth interviews with the founding leaders of six firms constituted as spin-offs from the Public University of Navarra (henceforward, UPNA) and other agents related.

The objective is to highlight a series of common aspects that configure the characterization of this kind of firms. In addition, through a comparative case study, the aim is to identify the main challenges these companies face, as well as to determine the role that the entrepreneurial ecosystem fostered by UPNA plays in how spin-offs overcome said challenges. Diverging from the focus on this particular University, the purpose is also to provide conclusions applicable to the generality of firms that fall into the category of university spin-offs.

Summing up, the research questions of this study could be posed as follows: Which are the most relevant characteristics that define the phenomenon of university spin-offs? How do the particularities of this kind of firms affect the main the challenges they face and which are these challenges? How does the entrepreneurship ecosystem help university spin-offs overcome said challenges?

In the following sections, the aforementioned aspects will be developed. In the first place, a literature review on the phenomenon of university spin offs will be offered, with the purpose of presenting the analytical framework for drawing conclusions regarding the characterization of this kind of firms within the case study. Later, the main methodological aspects of qualitative research will be explained and the the spin-offs that conform the multiple case study will be presented. Results will be discussed in the next section; first, the analysis on the common features of the detected companies will be presented, in order to advance in the reflection on the characterization of university spin-offs, and the main challenge facing these companies will be stated. Second, an overview will be offered on the UPNA entrepreneurial ecosystem and, in particular, on the actions aimed at supporting the creation and sustainability of university spin-offs, in order to determine about their role in facing the challenge detected. Finally, the conclusions of the study will be summarized.

2. Literature review and analytical framework

The current understanding of the mission that universities embody as social institutions has been reflected in various academic contributions. For example, in the context of innovation ecosystems, Etzkowitz and Leydesdorff's (1990) triple helix model established the premise that in order to foster economic and social development, the triad University-Industry-Administration needs to be aligned. This theoretical construct would be complemented years later by Carayannis and Campbell (2009), who added a 'fourth helix' to include society in the model, as an agent that both demands and co-creates knowledge and emerging technologies.

The interaction between various agents and the transformative nature of knowledge was also the object of reflection in the reference work by Gibbons et al. (1994), who proposed the existence of two paradigms regarding the production of knowledge and the role of the University in economic and social development. The traditional paradigm ('mode 1') implies the development of basic research activities by universities, the results of which are disseminated to society through their educational work. 'Mode 2' considers universities as key actors for the transfer of knowledge and technology to industry and society, through both the inclusion of applied research work in the academic field and the commercialization of the knowledge generated (Gibbons et al., 1994; Miller et al., 2018).

Academic literature has coined the term 'entrepreneurial university', to address this institution that generates knowledge and technological advances and disseminates them through different mechanisms, participating in interactions with private companies and other economic agents, exploiting entrepreneurial opportunities, and thus contributing to economic and social development (Rothaermel et al., 2007; Centobelli et al., 2019).

In this context, the creation of university spin-offs is one of the main mechanisms by which the 'entrepreneurial university' generates knowledge and transfers it to society. For the purposes of this study, the term 'university spin-off' refers to a company that commercially exploits technology and/or knowledge resulting from research carried out in a university, whose creation normally implies the participation of the academic staff involved in said research and the support of the university for within it originated (Löfsten and Linderlöf, 2005).

In order to guide the data analysis, a framework was designed beforehand, based on relevant literature on the spin-off phenomenon (i.e., Ortín et al., 2007; Iglesias et al., 2012; Rodeiro et al., 2012).

Ortín et al. (2007) highlight the study of aspects related to the founding team, in terms of the motivation to launch the initiative and the assessment of the team profile, extending this consideration to the expanded team with subsequent incorporations. This paper also pays attention to the characteristics of the financial resources of the spin-offs, with special emphasis on the aid received. Information on the size and age of the companies is also provided. The aforementioned aspects are echoed in the work by Iglesias et al. (2012), who in turn rely on relevant research to extract the key elements for the analysis of the characterization of the spin-offs in their sample. Thus, in addition to the generic elements of the companies referring to their size and maturity, they study aspects related to the casuistry of spin-offs, such as the differential advantage they have based on being companies with an intense dedication to R&D&I activities. They also consider their participation in networks, and financing aspects, distinguishing between investments in capital, obtaining aid and generating income.
Taking into account all the above, the analytical framework for studying the characterization of university spin-offs contemplates the following specific aspects:

- Origin and team
- R&D&I activity and networks

- Financing
- Business model

Size and maturity are equally prominent aspects in the literature for the characterization of this type of companies. In this work, a certain correlation between size and maturity can be observed, and we have chosen to consider these data transversally for the analysis of the other aspects listed.

3. Methodology

This study adopts a qualitative approach, the purpose being to draw conclusions regarding the idiosyncrasy of university spin-offs phenomenon through a multiple case study. Although it is important to recognize the limitations of the qualitative methodology based on case studies, especially with regard to the generalization of the results, it is also true that this methodology is very appropriate to deepen the understanding of complex phenomena and to carry out inductive research (Eisendhardt, 1989; Yin, 2003). In addition, the multiplicity of cases used is a method that favors triangulation (Jick, 1979) and the generality of the results (Yin, 2003), providing robustness to the research (Herriot and Firestone, 1983).

Information was gathered through semi-structured interviews with founding partners and employees, as well as by comparing the documentation presented when applying for the official UPNA spin-off recognition. In addition, sources such as press releases, sector reports and financial data complemented the information. Subsequently, individual reports were drawn up for each of the six companies, with the aim of conducting an analysis for each case (Eisenhardt, 1989; Yin, 2003). Finally, a comparative study was conducted on the basis of these reports.

The six firms of the study were created within a period of seven years, obtained the UPNA spin-off qualification between 2014 and 2018, and are diverse in terms of maturity and fields of activity. However, all of them carry out businesses related to the commercial exploitation of advanced technology originated from the academic research of their promoters.

Appendix 1 shows a table synthetizing the identifying aspects of the six spin-offs of the study.

4. Results and discussion

4.1 Characterization of university spin-offs

4.1.1 Origin y team

Two were the main objectives pursued by the founders when deciding to embark on an entrepreneurial project: technology transfer and talent retention. These motivations respond to the idiosyncrasy of the figure of the university entrepreneur, for whom the achievement of economic results and social status is not as attractive as being able to exploit a business opportunity detected in connection with their scientific-technical discoveries (Ortín et al., 2007).

As a rule, the spin-offs have consolidated highly trained teams with a clear scientific-technical profile and, with a few exceptions, mostly male. In this sense, Iglesias et al. (2012) contrast the small size of this type of company with its ability to bring together a high percentage of highly qualified personnel. In addition, previous literature highlights the youth and gender (male) of both the founders of these companies (Rodeiro et al., 2012), and their teams consolidated over time.

These considerations notwithstanding, several companies in this study express the convenience of guaranteeing a certain level of multidisciplinary in their teams.

> *"We are a multidisciplinary team; we come from very different fields: mathematics, computer science, telecommunications, sports medicine, physiotherapy, geriatrics... We have the knowledge, we have the technology, and we are convinced that what we do matters, because it helps a lot of people." (Mariano Velasco, founding partner and CEO of Movalsys)*

Other companies in the study reached similar conclusions as they progressed in their business trajectory. For instance, in 2011 two new partners with expertise in business and commercial management in the ICT sector joined Naudit, in order to foster the establishment of a subsidiary firm.

In short, it should be noted that as UPNA spin-offs reach maturity, there is a tendency to expand the teams and diversify the profile (both in terms of gender and in terms of fields of knowledge), although maintaining the highly qualified staff.

4.1.2 R&D&I activities and networks

All spin-offs in the study are technology-based companies, whose business idea strongly identifies with the development of innovative technologies. Therefore, the firms show a clear commitment to innovation culture and to R&D&I activities. Besides, all spin-offs carry out said activities with the participation of external agents.

In particular, these companies maintain a close institutional relationship with UPNA, which is articulated mainly through the joint development of research projects, the formalization of technology transfer agreements and the hiring of graduates. In addition, five of the six companies use the equipment and facilities of UPNA for the development of their activity.

According to the study by Iglesias et al., (2012), university spin-offs often use the formula of collaborative projects for the development of their R&D&I activities, thus involving scientific staff from the research group from which they emerged. In short, the strength of the links between UPNA and its spin-offs aligns with conclusions highlighted in the literature (e.g., Soetanto and Jack, 2016). Unlike other types of start-ups, university spin-offs maintain ongoing relationships with their institution of origin, whose support plays an essential role at several levels, including aspects such as advice in both technical and commercial areas and intermediation in financing issues (Iglesias et al., 2012), giving rise to a symbiotic relationship from which both the University and the spin-off benefit.

> *"Since the creation of Naudit, we deemed it important that our universities were part of the development of the firm. But we didn't see this participation so much from the point of view of obligations for the universities, but from the point of view of trying to have an impact on society. The achievements at Naudit should translate to the universities that have trusted us throughout these years." (Eduardo Magaña, founding partner of Naudit)*

In any case, the R&D&I practices carried out by this type of firms do not participate in this open paradigm solely because of their connection with their institution of origin, but rather encompass a broader catalog of activities and participating agents (Miller et al., 2018). In this sense, R&D&I activities in UPNA spin-offs, apart from implying close ties with the University, are also developed through collaborative projects with clients, suppliers, other research centers and other firms. In short, university spin-offs have an open attitude to collaboration, to the development of alliances and the use of synergies, consolidating networks with strategic agents of innovation and entrepreneurship systems (Iglesias et al., 2012).

4.1.3 Financing

The firms in this study saw their initial social made up almost entirely of the contributions of the academic entrepreneurs who promoted the initiative. This corresponds to the trend detected for this type of company, in which the main contribution to capital is the founders' own savings (Ortín, 2007; Rodeiro et al., 2012).

However, partners outside the project entering the capital of university spin-offs is a source of financing for which there is a growing trend, especially in the early stages of development of these firms (Iglesias, 2012). Among these external partners, the participation of the institution of origin stands out, which is very significant inasmuch as it stands as one of the main mechanisms to promote the objectives of the entrepreneurial university. Although it is an underdeveloped instrument, its advantage transcends the merely financial sphere, since it implies the involvement of an institution with a great knowledge of the problems, equipment and technology of the initiative (Rodeiro, 2012). Indeed, of the six companies analyzed here, five of them have UPNA participation in their capital, albeit with modest participation percentages, which range between 4% and 5%.

In addition, several spin-offs count with participation of other agents, such as 'family, friends and fools', industrial partners and, especially, investment funds and venture capital companies. These are sources of a very heterogeneous nature, in terms of accessibility, cost and implications. The low cost and ease of access represented by the savings of close people contrasts with the traditional limitation of this type of resources, which in any case are usually the first source that entrepreneurs turn to (Rodeiro et al., 2012) . On the other hand, the participation of industrial partners depends on the knowledge and skills that the new agents

incorporate into the company, complementing its needs. This is the case of Naudit, which in 2011, and with the aim of separating the commercialization of their products and services from R&D&I activities, constituted a subsidiary company. Regarding the creation of this new company, two partners who are experts in business management in the ICT sector joined the project.

> *"The participation of external partners is not valued in terms of financing; it is valued in terms of the technical or commercial contribution that they can provide." (Eduardo Magaña, founding partner of Naudit)*

Finally, it is worth mentioning financing through capital investments made by venture capital entities, investment funds and, as a hybrid instrument, the participative loan. For example, Eversens has received capital contributions from a public venture capital company, a semi-public investment fund, and a private fund. This type of mechanism is a very attractive solution in the early stages of university spin-offs, given the limitation of the aforementioned resources and as an alternative to traditional debt (Rodeiro et al., 2012).

Subsidies and aids for the development of R&D&I activities are other typical forms of financing university spin-offs, which implies the participation of different bodies from state and regional administrations and, to a lesser extent, bodies of the European Union (Ortín et al., 2007; Rodeiro et al., 2012). Among the UPNA spin-offs, it is clear that access to this type of resources is essential for the advancement of the different initiatives.

4.1.4 Business model

University spin-offs tend to function emulating the dynamics of university research groups (Iglesias et al., 2012), in the sense that they usually become the external R&D department of other agents. However, it has been pointed out that these companies undergo a permanent reconfiguration, in order to reorient their service and product portfolios and adapt their business models to the changing needs that arise in their trajectories. (Iglesias et al., 2012; Clausen and Rasmussen, 2013).

The cases in this study reveal notable changes in the strategies and business ideas of the UPNA spin-offs. Moreover, as firms mature, they let go the focus on a value proposition based on basic research and the exploration of disruptive technologies, and open up to the search for opportunities and the commercial exploitation of its technological results.

As an example, several years after into its activity, Anteral verified that the application of terahertz technology for production techniques was a line that required great efforts in R&D, which was hard to profit from. The company decided to focus efforts on Industry 4.0, developing its own radar systems, which could lead to a more marketable product. In the same way, Nadetech is currently in the process of implementing a strategic plan with the aim of systematizing and professionalizing the operation of the company. In a similar vein, Naudit began its journey by offering highly specialized, personalized and high-value solutions related to traffic analysis consulting and to the inspection and quality assurance of communication networks. In 2011, the incorporation of the two industrial partners and the delimitation of commercial activities promoted the definition and expansion of the client portfolio.

In short, the spin-offs of this study have experienced the need to focus their efforts on practices that guarantee turnover through the exploitation of knowledge and technology in new markets, as opposed to a first vocation more oriented to basic research and technological exploration, a vocation that undoubtedly derives from the academic environment in which the initiatives arose.

4.2 The challenge of ambidexterity and the role of University Entrepreneurship ecosystem

The comparative analysis lead to conclude on the difficulties arising in the search and consolidation of a sustainable business model that combines the use of the disruptive innovative capacity of these initiatives with the sustainable exploitation of their research results. This problem is due to the particular idiosyncrasy of this type of firms, deeply linked to R&D and the modus operandi of their institutions of origin, largely dependent on public funding for the development of these tasks, and with eminently technical teams who usually lack managerial and commercial experience. In line with the arguments in favor of the ambidextrous company (e.g., Gupta et al., 2006), it has been pointed out that university spin-offs, which normally face higher levels of uncertainty than other startups, ups, should combine exploration strategies with exploitation strategies (Soetanto and Jack, 2016).

4.2.1 Ambidexterity in university spin-offs

Management deficiencies are common in university spin-off teams. Literature has linked the failures of this type of firms with problems in the management team and not with the suitability of the technology or the business opportunity (Timmons, 1994). In this sense, it is particularly important to focus on the figure of the university entrepreneur, who considerable challenges, especially considering that their professional experience and personal skills are not usually aligned with the demands in the field of business management (Miller et al., 2018).

This way, the studies underline the complexity of the creation of companies derived from the scientific-university field, which need to combine the management of technical challenges with commercial and organizational efficiency. These challenges are boosted by the fact that the teaching and academic staff in charge of university spin-offs lack in most cases a market orientation, which constitutes a significant disadvantage (Gómez et al., 2007). In fact, founders and managers of these firms declare themselves aware of said disadvantage (Ortín-Ángel et. Al., 2007), also informing of a feeling of 'loneliness' (Rodeiro et al., 2012) in the face of the uncertainty in the market and regarding the approach to the business strategy.

For this reason, the heterogeneity in terms of technical and management profiles in the teams in charge of the university spin-off has been pointed out as a factor that influences their chances of success (Ortín-Ángel et. Al., 2007). Thus, in its development process, the founding team tends to be complemented by professionals in commercial and business management (Vanaelst et al., 2006, Rodeiro et al., 2012).

These issues have been reflected in our case studies, from the main deficiency in management areas detected in the human teams of the spin-offs, to the tendency to diversify them as the companies mature, in order to promote the entry of people with profiles complementary to the eminently scientific-technical ones of the founders.

After all, university spin-offs originate from the development of scientific-technological solutions, through intensive R&D processes in research departments, so the germ of the idea does not reside inasmuch the detection of a need in the market as in obtaining said solution (Fuentelsaz et al., 2017). Thus, these types of initiatives are much more prone to strategies for exploring disruptive technologies than to exploitation strategies (Colombo et al., 2015).

Bearing this in mind, the success of university spin-offs depends on their abilities to combine the maintenance of their competitive advantage based on the development of high technology with organizational and commercial skills that allow them to succeed in the positioning of the business model (Ortín-Ángel et al., 2007). In short, it is all about attending to the two strategies –i.e., the exploration of new opportunities and the exploitation of old certainties–identified by March (1991). Literature has underlined that the synergistic effect between the two mentioned strategies may be beneficial, arguing in favor of the development of ambidextrous strategies, which imply the dedication of effort and resources both to the development of new disruptive technologies, and to exploiting the knowledge base of the company (Gupta et al., 2006).

Focusing on ambidexterity for the particular case of university spin-offs, the study by Clausen and Rasmussen (2013) concludes that the most innovative and successful spin-offs in the commercialization of research results are those that establish complex business models that take advantage of the complementarity among the different alternatives for exploiting said radical technologies.

4.2.2 The role of university ecosystem in overcoming the challenge of ambidexterity

UPNA articulates a great variety of these instruments, acting on many occasions hand in hand with the institutions and instruments of the regional public administration, creating an ecosystem to support entrepreneurship that aims to promote the creation and development of business initiatives. This way, internal agents such as the Research Service and the Vice-Rector's Office for Students, Employment and Entrepreneurship coordinate with external agents such as the European Center for Business and Innovation of Navarre (hereinafter CEIN), the Company for the Development of Navarre (hereinafter SODENA), the Government of Navarre or banking institutions to stimulate and promote the aforementioned actions.

Regarding the ecosystem instruments used by the companies in this study to support the development of the initiatives, the mechanisms for accessing to financing stand out. The investment funds of the entrepreneurial

ecosystem play a very important role in this regard, as indicated in the characterization of the companies in the study. Eversens has the participation in its capital of companies such as Start Up Capital Navarra and SODENA. As for Nadetech, SODENA stands out as one of the most relevant agents when it comes to providing help to overcome obstacles, for the support provided to access the Navarre Tech Transfer investment fund. These firms benefit, beyond financing, from the advice offered by these partners.

> *"Financing is essential to execute the plans developed; even so, up to now we have always sought investors who can contribute more than just money. Specifically, our investor Navarra Tech Transfer is providing us with contacts of interest and support in management, helping to professionalize the company." (Juan Antonio Ruiz, CEO of Nadetech)*

Besides financial support, the instruments of the UPNA ecosystem most valued by spin-offs are those related to training and advice. In particular, the firms highlight the services offered by CEIN. According to Lucía Nieto (CEIN technician), the programs that are usually most interesting for academic entrepreneurs are those that offer business advice, which are highly valued by UPNA spin-offs:

> *"During our stay at CEIN, we expanded the knowledge received by participating in various events aimed at MEDTECH companies. The actions were aimed at regulatory, marketing, negotiation and sales issues." (Juan Mari Pérez, founding partner of Eversens)*

The trajectories of the UPNA spin-offs reflect how they have undergone notable changes in their business models in terms of the design of marketing strategies for their highly specialized technologies. In this sense, the comparative study makes it possible to link this openness to strategic visions of a more commercial type with the use of the support instruments of the UPNA entrepreneurial ecosystem.

> *"The business model of these projects is evolving (...). University spin-offs are usually created before defining fundamental aspects of the business model. There is a need for a reorientation because, for example, customers are not defined or segmented. It is important that they participate in these kind of programs to question and define the business model (...); so they can get the necessary reorientation, advice and training." (Lucía Nieto, CEIN technician)*

Thus, the mediating role of the ecosystem stands out in enabling the development of management skills and a commercial vision and, in general, to promote reflections regarding the orientation of the business model.

5. Conclusions

This paper has offered a comparative analysis of six university spin-offs, based on case studies, whose aim was to determine a series of common features that could configure the characterization of these kind of firms, with the purpose of offering a contribution to complement the studies on the phenomenon of university spin-offs and their idiosyncrasy. In turn, this paper also intended to identify the main challenges these companies face, and to carry out an exploratory study on how the university ecosystem influences in overcoming these challenges.

As a summary, the following list of aspects can be presented as a general characterization proposal applicable to the university spin-offs phenomenon:

- The motivations driving the creation of university spin-offs are the transfer of knowledge and technology, and their commercial exploitation, on the one hand, and the generation of job opportunities to retain talent in the region, on the other.
- The profile of the academic entrepreneur corresponds to male highly qualified in scientific-technical areas. Diversification in this profile, both in terms of gender and in terms of areas of experience, arises as companies mature and teams expand.
- The spin-offs show a marked commitment to the culture of innovation and to R&D&I activities. These companies participate in collaborative projects with their institution of origin and also with clients, suppliers, other research centers and other companies.
- The spin-offs maintain a close relationship with the universities from which they emerged. In addition to the continuous development of joint research projects together and the usual formalization of technology transfer agreements, the teams in these firms usually come from these universities, which also tend to provide the firms with equipment and facilities for the development of their activity.

- To start-up the initiatives, the spin-offs are financed mainly with their founders' savings; however, it is worth highlighting the participation of funds contributed by various agents, such as the university of origin, industrial partners and investment funds.
- Another representative and generalized form of financing in the phenomenon of university spin-offs is the aid for the development of R&D&I activities of the various public administrations.
- University spin-offs, throughout their trajectory, experience profound changes in their business strategies and ideas. In general, they experience the need to refocus towards exploiting knowledge and technology in new markets, in contrast to an early vocation more oriented to basic research and technological exploration.

After all, university spin-offs are technology-based firms closely linked to the work of their home institutions, with technical profiles that often present notable deficiencies in management areas. Therefore, they are more likely than other types of companies (even other types of technology-based start-ups) to remain stuck in strategies that prioritize basic research and the exploration of disruptive knowledge. The difficulties in adopting a market vision therefore lead to a greater incidence in this type of companies to replicate the *modus operandi* of the research departments of the universities and end up becoming laboratories that provide R&D services to other agents. However, the success of these initiatives has been linked to the ability to manage resources and tensions in order to carry out an ambidextrous strategy. The role of the entrepreneurial ecosystem energized by the University acquires a special relevance in overcoming this challenge of ambidexterity. The analysis concludes on the relevance of the ecosystem instruments aimed at filling the initial shortcomings of academic spin-offs in management and commercial strategy matters, both with regard to participation in training and specific programs, and through the entry into the capital stock of specialist investment companies that, in addition to financing, offer advice.

Appendix 1: UPNA spin-offs

	Origin	*Activity*	*Currently*
Anteral, SL	Idea: 2008 Constitution: 2010 UPNA seal: 2017	Development and commercialization of high performance and custom antennas for the aerospace industry; of millimeter wave and terahertz technology, with medical and pharmaceutical industrial applications, and of sensing systems to control production systems and perform measurements in a non-invasive way.	10 workers. Sales: 0.5 million €. Clients: major aerospace agencies, public administrations, universities and research centers.
Nadetech Innovations, SL	Idea: 2008 Constitution: 2011 UPNA seal: 2014	Development and commercialization of equipment related to nano-metric thickness coating deposition techniques, for application in the scientific and research field.	7 workers. Sales: 0.5 million €. More than 100 clients in more than thirty-five countries, mainly laboratories and universities.
Naudit HPCN, SL	Idea: 2009 Constitution: 2009 UPNA seal: 2014	Development and commercialization of tools for data traffic analysis, network monitoring and advanced measurement data analysis.	More than 20 workers in both firms (in 2011, a subsidiary was created). Sales: 1 million €. National and international clients from the banking sector and the telecommunications sector.
Eversens, SL	Idea: 2015 Constitution: 2015 UPNA seal: 2017	Development and commercialization of equipment for measuring biomarkers in human breath, which allow the non-invasive diagnosis of certain diseases.	6 workers. In the process of closing commercialization agreements for their product 'evernoa'.
Movalsys, SL	Idea: 2015 Constitution: 2015 UPNA seal: 2016	Development and commercialization of software and measurement sensors for the study of movement patterns, and for evaluating and monitoring injuries, with applications in the clinical field.	10 workers. Clients: Navarre Brain Damage Association (ADACEN), large automobile companies, residences for the elderly, and sports clubs.
Bioinsectis, SL	Idea: 2016 Constitution: 2016 UPNA seal: 2018	Development and commercialization of biotechnology solutions in the field of insecticides of microbial origin for pest control, with applications in the agricultural and medical-veterinary sectors.	6 workers. Sales > 200.000 €. Clients: national and international companies in the phytosanitary sector; specifically, of the new bioinsecticides.

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The Development of Solvency Analysis Methods for Entrepreneurship

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Abstract: The successful development of profitable, solvent and financially sustainable enterprises lies at the root of an effective market economy. In the modern conditions, when an enterprise develops by the own sources of funding together with the loan capital using, the problem of maintaining a sufficient level of the company's solvency becomes especially relevant. Correct and timely accounting of the level of solvency allows company to respond in time to the lack of funds, to avoid bankruptcy and to increase the company's investment attractiveness which is especially important for the small business entrepreneurship. The paper analyzes up-to-date methods for assessing solvency, discloses the essence of solvency, and identifies factors that affect the company's solvency. It is shown that solvency analysis methods must have their own peculiarities for enterprises of different profile, and the required solvency level of the enterprise does not always coincide with the normative one. Based on the results of the study, an in-depth method for analyzing solvency has been developed. The proposed method is based on determining the required level of current asset ratio indicator, calculated individually for each enterprise, based on the specifics of its business. The peculiarity of this approach is that the assessment of the solvency level is made on the basis of comparing the actual level of the coverage ratio not only with its generally accepted limitation, but also with its required level, which takes into account the peculiarities of the functioning of the certain enterprise. The specific methods for calculating the required level of current asset ratio indicator for different types of enterprises were developed. These methods presume the in-depth analysis of the composition and structure of the company's working capital, the state of receivables and inventories. Such an approach will allow to improve the solvency analysis of a company and to raise the efficiency of its business.

Keywords: solvency, liquidity, analysis, entrepreneurship, efficiency

1. Introduction

Creating favourable conditions for the development of entrepreneurship is one of the key factors in the formation of a developed market economy (Ahlstrom, 2010), (Steil, Victor and Nelson, 2002). In the conditions of market economics, when an enterprise develops by the own sources of funding together with the loan capital using, the problem of maintaining a sufficient level of the company's solvency becomes especially relevant (Vertakova and Kulikov, 2014). Enterprises have to withstand tough competition in attracting loan capital to finance business and innovations. Correct and timely accounting of the solvency level allows the enterprise to avoid bankruptcy and to increase the investment attractiveness of the company (Asaturova and Khvatova, 2019). However, the analysis of solvency of industrial enterprises in Russia shows that the debt of economic entities is a rather frequent phenomenon at present (HSE Publishing, 2020). Many organizations receive insolvent status because of their inability to adapt to the market conditions and correctly assess the liquidity of their balance. Therefore, the development of a methodological framework for analyzing the solvency of an enterprise, as well as solving the problem of maintaining its required level, is particularly relevant.

In modern literature, a large amount of works by Russian and foreign authors are devoted to the problem of solvency analysis and its role in management of enterprises (Asaturova, 2019), (Brealey, Myers and Marcus, 2017) (Lee and Saen, 2012), (Neff, 2002), (Sheremet, 2011), and evaluating their investment attractiveness (Swinkels et al, 2018). In the works by (Wang and Zhou, 2016), (Biger, Gill and Mathur, 2010) the special role of the analysis of the company's solvency in the management of the company's financial activities is shown, and the assessment of its investment attractiveness is demonstrated. In the works (Abramov, 2016) and (Madrid-Guijarro, Garcia-Perez-de-Lema and Van Auken, 2016) examines the problems of analyzing the solvency in enterprise management during the economic crisis. The work by (Zharov, 2018) discusses the issues of managing the solvency and creditworthiness of the company based on the analysis of cash flows. The most up-to-date methods for analyzing solvency were presented in works by (Asaturova, 2018), (Granda, 2020), (An and Zhang, 2018), (Savitskaya, 2012) and (Zhabina and Tuyakova, 2014). However, these methods do not take into account the existing features of the formation of working capital in various type of business. For example, when analyzing the solvency of industrial enterprises, special attention should be paid to the analysis of the structure of working capital (Zhidkova and Kokoreva, 2012) and the state of its receivables (Lebedeva and Teryayeva, 2016). The theoretical positions considered in the mentioned works served as the basis for the author's development of an

in-depth approach to the analysis of the company's solvency. This method allows to take into account the peculiarities of the enterprise activities.

Thus **the main aim of the presented work** is the analysis of modern solvency analysis methods and the development of an in-depth approach to adjust the assessment of the level of solvency of an enterprise, based on the specific conditions of its activity. The paper uses computational and analytical research methods based on regulatory models of financial analysis, allowing to compare the actual performance of enterprises with the expected values, such as the method of calculating analytical coefficients, comparative analysis and factor analysis.

Achieving the goal involves solving the following tasks:

- 1. Determination of the essence of solvency.
- 2. Analysis of factors affecting solvency.
- 3. Analysis of modern methods of assessing solvency.
- 4. Development of an in-depth approach to the analysis of the company's solvency which allows to consider the specific of the enterprise activities.

2. The essence of solvency and factors affecting solvency

The solvency of an enterprise is one of the most important components of assessing its financial condition (Goldratt and Cox, 1992). It characterizes the ability of an enterprise to pay off its short-term liabilities on time with the help of current assets while continuing uninterrupted operations. Maintaining the required level of solvency provides the ability to attract loans and borrowings, and also determines their price for the enterprise. Justification of solvency to lending institutions and potential investors includes the search for available sources of financing, as well as an assessment of the feasibility and efficiency of their use. Knowing the level of the company's solvency is important for investors when monitoring investments, for credit institutions to determine the terms of lending and the degree of risk, for suppliers to be aware of the confidence in the timeliness of settlements for the supplied material values, as well as for tax and regulatory services that monitor the receipt of tax payments to the budget (Nguyen et al, 2019).

The use of the solvency indicator also plays an important role for the internal analysis of the company's activities in the implementation of such management functions as planning, current management and control, which are aimed at more efficiently achieving the established strategic goals of the enterprise (Mansfield, 1993). Correct assessment and control of the real level of solvency is very important for company leaders, founders, managers and financial analysts for internal use in company management. Therefore, the analysis of the essence of solvency and the correctness of its assessment for an enterprise is one of the key problems in a modern market economy.

Let us consider the essence of solvency and factors affecting its level. As we know from the theory of financial analysis, the solvency characterizes the ability of the enterprise to pay for its current liabilities with working capital use (Asaturova, 2018).

$$\textbf{Current asset ratio indicator} = \frac{\textbf{Working capital}}{\textbf{Current liabilities}} > 2$$

However, when analyzing solvency, it is important to understand that the formation of working capital has its own characteristics for enterprises of various industries. Therefore, to clarify the actual solvency of the enterprise, it is necessary to investigate the structure of working capital, which is especially important for industrial enterprises that have a large proportion of not liquid inventories. The structure of working capital consist of the following groups: cash, short-term financial investments, accounts receivable and inventory holdings.

The main principle of grouping items of working capital is the level of their liquidity and directions of use. The liquidity of assets is characterized by the speed of their circulation in cash. The most liquid group includes cash and short-term financial investments. Accounts receivable represent a less liquid group of working capital and include advances issued, consumer debt for goods shipped and other debts to the enterprise.

Inventory holdings is the least liquid part of working capital, but their value has a large proportion for industrial enterprises. Therefore, the study of the structure of inventories, as well as the liquidity of its individual components, is of great importance in the in-depth analysis of the solvency of the enterprise. Thus, among the main factors affecting the solvency of the enterprise, it is possible to distinguish cash, short-term financial investments, receivables, the material part of working capital and current liabilities. For an in-depth and real assessment of the company's solvency, it is especially important to analyze the composition and structure of inventories, as well as the state of receivables, since their real liquidity can affect the company's solvency. Let us consider the existing methods of analyzing the solvency and analyze the influence of the selected factors on the analysis of the company's solvency.

3. Modern methods of assessing solvency

According to the analysis of the up-to-date methodic of financial analysis, we can distinguish three traditional indicators to assess the solvency of enterprise (Asaturova, 2018). Their level is usually estimating by dividing the working capital or its elements by the amount of the current liabilities of the enterprise. The level of solvency indicators shows which part of the short-term debt can be repaid by the working capital available to the enterprise. These indicators differ by the level of liquidity.

The first one is the **absolute liquidity ratio** which is calculated as the ratio of the most liquid part of working capital, namely cash and short-term financial investments, to the amount of its short-term debt. This ratio shows what part of the short-term debts the company can repay at the moment using the available liquidity. According to the existing methods of analyzing the solvency of an enterprise, its generally accepted limitation varies within the range of more than 0.2 or 0.3, however, for industrial enterprises, due to the large proportion of material circulating assets and the need to settle with suppliers, the recommended value of 0.3 should be adhered to.

The second indicator is the **intermediate coverage ratio**. When calculating it, projected cash receipts for settlements with debtors are added to the most liquid group of working capital. Inventories of goods and materials are excluded from working capital, since they are necessary for the enterprise itself to continue the continuity of production. The indicator assesses the payment capabilities of an enterprise, subject to timely settlements with debtors. According to the existing methods of solvency analysis, the recommended value for the intermediate coverage ratio is more than 1. This limitation suggests that the available cash, short-term financial investments and receipts from settlements with debtors should fully cover the short-term debts of the company. In this case, the material working capital remains at the disposal of the company to continue its activities. However, for industrial enterprises, the recommended value can be reduced to 0.7, since the composition of the working capital contains a large proportion of finished products, which, if successfully sold, can also be used to pay off the company's short-term debts.

The most important indicator in assessing the company's investment attractiveness, in our opinion, is the third indicator — **current asset ratio indicator** (CR), as it assesses the overall payment abilities of the enterprise, including the debts payment together with the opportunity of further running of business. It is advisable that working capital should exceed the company's current liabilities by at least two times, as the most liquid assets can be used to pay debts, while material assets remain at the disposal of the enterprise. In addition, it is one of the main conditions in identifying the bankruptcy of an enterprise in accordance with the "Methodological provisions for assessing the financial condition of an enterprise and establishing an unsatisfactory balance sheet structure." Its normative value, established by the state at least two, is a necessary (but not sufficient) criterion for bankruptcy.

These three indicators are effectively used in the express analysis of the company's activities, the purpose of which is to present the company in the most favorable light to potential partners, investors and creditors. The values of these indicators are calculated for the last three years and are included in the financial section of the business reference for the enterprise, and their value is the basis for justifying the possibility of attracting loans to the enterprise (Kiseleva et al, 2017).

However, the methods of their calculating does not take into account the specifics of enterprises with a large proportion of working capital. The level of the current asset ratio indicator equal to two does not guarantee a high degree of the company's solvency. For some enterprises, the required level may exceed the established value, while for others it may be higher. This is influenced by the structure of working capital, as well as the state

of inventories and accounts receivable of the company. In industries with a high turnover of current assets, the value of the ratio is considered acceptable at the level of 1.5. At the same time, for industrial enterprises with a large proportion of hard-to-liquid inventories, a sufficient value of the coverage ratio can significantly exceed the value set by the state, equal to two.

Thus the analysis of the structure of inventories, as well as the status of receivables, is important for the in-depth analysis of the solvency level of the enterprise since their liquidity of may affect the real solvency. For the most complete analysis of the solvency of an industrial enterprise, we propose a refinement method that takes into account the influence of these factors.

4. Development of an in-depth method of the company's solvency analysis

Let us discuss the development of methods for in-depth analysis of the solvency of an industrial enterprise. As noted above, the structure of working capital and the assessment of solvency have its own characteristics for enterprises in various businesses. This is especially significant for industrial enterprises with a large proportion of hardly liquid material assets. Practice shows that for such enterprises real solvency may not coincide with the calculated one (Malevskaia-Malevich et al, 2018). Therefore, despite the existence of generally accepted restrictions, the assessment of solvency requires a careful analysis of the structure and composition of current assets at each enterprise. For example, for industrial enterprises it is important to correctly evaluate the liquidity of working capital and receivables. The traditional solvency ratios do not take into account these peculiarities. Therefore, to clarify the calculation, we offer an in-depth methodology for analyzing the solvency of an enterprise based on the current asset ratio indicator.

In the developed methodology to clarify the assessment of the solvency of enterprises, it is proposed to compare the actual value of current asset ratio with its required level calculated individually for each enterprise based on the analysis of the state of its current assets.

The main factors affecting the solvency of the enterprise are material working capital and accounts receivable. Therefore, when justifying the required level of coverage ratio, it is important to analyze the composition, structure and liquidity of inventories and settlements with debtors. So, for example, it is necessary to take into account whether the enterprise has excess material working capital, and whether their liquidity is sufficient for the sale and transformation into cash. The opposite situation is also possible, when an enterprise, due to unreliability of supplies or changes in the conditions for selling products, needs to increase the guarantee stock and use more material resources than is recorded on its balance sheet. It is also necessary to analyze whether the company has bad or doubtful accounts receivable. All this must be taken into account in an in-depth analysis of solvency using the overall coverage ratio. The assessment of the status of receivables and inventories, as well as the calculation of the required level of coverage ratio can be performed by the company's specialists. Thus, while calculating the required level of enterprise solvency it is important to analyze the structure and liquidity of inventories and settlements with debtors.

Within the framework of the developed approach, the following methods for calculating the required level of current asset ratio indicator for an enterprise, based on the specific of its activity were developed. It is suggested that while calculating the required level of current asset ratio, it is necessary to take into account the amount of the working capital necessary for continuing operations together with the debts payment. If the surpluses or deficiencies in working capital were found out, as well as the presence of doubtful or uncollectible receivables, the required working capital must be adjusted by the indicated amounts.

Thus, in the analysis of solvency, 2 main approaches can be distinguished:

- 1. A standard approach based on calculating three solvency ratios and comparing them with generally accepted restrictions. This approach is more suitable for express analysis of enterprise activities, carried out primarily for external users. Its goal is to present the company in the most favorable light to potential partners, lenders and investors.
- 2. The author's proposed refined approach to the analysis of solvency, which can be used by the specialists of the enterprise in addition to the standard method of calculating the coefficients for in-depth analysis of the company's activities. Its purpose is to analyze the factors affecting the real solvency of a given enterprise and to substantiate a sufficient level of the company's solvency, based on the specifics of its activities. At

the same time, the actual level of solvency is compared not only with its generally accepted limitation, but also with its required level, calculated individually for each enterprise.

Within the framework of the developed approach, the author proposes the following methods for calculating the required level of coverage ratio for a given enterprise, based on the specific conditions of its activity. As you know, when calculating the actual level of the coverage ratio in the numerator, the amount of the company's current assets on the balance sheet is taken into account. When calculating the required level of coverage ratio, it is proposed to take into account the working capital required by the enterprise to continue activities and pay debts. Such working capital includes inventories necessary for uninterrupted operation, as well as liquid working capital in an amount covering accounts payable settlements.

The developed in-depth approach to the analysis of the solvency of an industrial enterprise includes the consistent implementation of the following steps:

- 1. The calculation of the standard current asset ratio indicator and its comparison with the generally accepted limit equal to two.
- 2. Justification of sufficient level of solvency of the enterprise based on the specific of its business and calculation of the required level of current asset ratio.
- 3. Comparison of the actual value of the current asset ratio with its required level which could show the real solvency of the company.

5. Examples of the practical implications of the in-depth approach

The assessment of the company's solvency, proposed by the author of the in-depth methodology, and the specifics of calculating the required level of coverage, are discussed in examples 1-3.

Example 1. *In-depth analysis of the company's solvency based on the required level of current asset ratio.*

Enterprise No. 1 has a following working capital structure:

- material circulating assets - 50,000 rubles.
- settlements with debtors - 60,000 rubles.
- money and short-term financial investments - 5000 rubles.

The short-term debt of the enterprise amounted to 40,000 rubles.

Additional conditions are not analyzed in this example. Let's evaluate the company's solvency.

The actual coverage ratio: (50,000 + 60,000 + 4,000) / 40000 = 2,875

The actual level of coverage is higher than the generally accepted limit of two, so it can be considered solvent. But let us think if this level is sufficient for this enterprise? To clarify this issue, we calculate the required level of coverage for this enterprise. When calculating the actual coverage ratio, the present values of the company's current assets are taken into account, but when we calculate the required level of coverage, only the required current assets that are necessary to continue and pay debts are taken into account.

To continue uninterrupted activity after payment of debts, the enterprise must have material working capital in the amount of 50,000 rubles. Consequently, to carry out activities with the simultaneous repayment of a long-term enterprise, 90,000 rubles are needed (50,000 + 40,000 = 90,000). In this case the required level of solvency could be calculated as 90000/40000 = 2,25.

As we see, the actual level of coverage is not only higher than the generally accepted limit of two. It is also higher than the required level calculated individually for a given enterprise, based on the specific conditions of its activities. Therefore, the company can be considered fully solvent.

Example 2. *The influence of additional parameters in the analysis of the company's solvency.*

Let us analyze additional conditions for *Enterprises No. 1*, namely, the composition and structure of working capital. According to the expert assessment of specialists, there are not enough material reserves in the asset. Taking into account the unreliability, it is necessary to increase the guarantee stock by 20,000 rubles. When analyzing the accounts receivable, it was revealed that it included 15,000 rubles hopeless.

Then the required level of current asset ratio could be calculated as: (50,000 + 40,000 + 20,000 + 15,000) / 40000 = 3,125

The actual level of preservation is the same - 2.875, since taking into account additional factors does not affect its calculation. We see that the actual coverage ratio is below its required level, therefore, despite a sufficiently high coverage ratio, the company's solvency is not sufficient. This example demonstrates the influence of additional conditions on the considered solvency of the enterprise.

Thus, the actual level of overall coverage ratios, even if it is high enough by traditional standards, may not be sufficient for the characteristics of the enterprise's ability to pay. It needs to be compared with the help of mindfulness. Recall that the required level is not a standard, but a specific value for a given enterprise in a given period, calculated on the basis of an analysis of the conditions of its activity.

Example 3. *The influence of the structure of working capital on the assessment of the company's solvency.*

Let us consider the influence of the structure of working capital on the real solvency of an industrial enterprise.

Enterprise No. 2 has the same as *Enterprise No. 1* the total amount of current assets and short-term debt. But the structure of current assets is different:

- material circulating assets - 80,000 rubles.
- settlements with debtors - RUB 30,000;
- money and short-term financial investments - 5000 rubles;

Short-term debt of the enterprise - 40,000 rubles.

Additional conditions, as in *Example 1*, are not considered. Let's compare the solvency of *Enterprises 1 and 2* (excluding additional conditions).

The actual level of the overall coverage ratio is the same as that of the *Enterprise No. 1*, since the total amount of working capital at the enterprises under consideration is the same:

The actual coverage ratio: (80,000 + 30,000 + 5,000) / 40000 = 2,875

The difference between the two analyzed enterprises will manifest itself only in the calculation of the required level of the coverage ratio, since the methods of its calculation make it possible to trace changes in the structure of working capital. The required level of coverage ratio is: (80,000 + 40,000) / 40000 = 3,0

In this case, the actual level of the coverage ratio, despite its high value, is below the required level. Therefore, the real solvency of the *Enterprise No. 2* is insufficient, and this insolvency is caused by the difference in the structure of its circulating assets in comparison with the structure at *Enterprise No. 1*. Let us analyze the differences in the structure of the working capital of the enterprises in question. We see that the liquidity of the structure of the working capital of the second enterprise is lower, since in comparison with the first enterprise, the proportion of hard-to-liquid material has increased, and this has caused deterioration in the real solvency of the enterprise.

These examples illustrate the use of an in-depth approach to the analysis of solvency in an industrial enterprise. This approach makes it possible to clarify the real solvency of the enterprise on the basis of studying the structure of working capital, as well as based on the results of the analysis of additional conditions, namely the composition and condition of inventories and receivables. This approach to the analysis improves the accuracy of assessing the solvency, as it makes it possible to take into account the individual characteristics of the functioning of the enterprise.

6. In conclusion

The paper shows that the analysis of solvency has its own particularities in various business, but standard coefficients do not fully take into account their specificity. The factors affecting the solvency of an enterprise, such are composition and structure of its current assets, the liquidity of inventories and receivables, are identified.

As a result of the study an in-depth approach to the analysis of the solvency of enterprises has been developed. The peculiarity of this approach is that the assessment of the level of solvency is made on the basis of comparing the actual level of the current asset ratio not only with its standard level, but also with its required level calculated individually for each enterprise, based on a study of the specifics of its activities. Within the framework of the developed approach, clarifying methods for calculating the required level of coverage ratio for industrial enterprises are proposed. These methods considers the composition and structure of the company's working capital, the state of accounts receivable and inventories, which is especially important for industrial enterprises, whose specificity is the large share of material circulating assets.

Note that the use of the advanced methodology proposed by the author does not exclude, but supplements and deepens the calculation of standard solvency ratios.

The developed approach can be used for an in-depth analysis of the solvency of industrial enterprises in order to improve the efficiency of their business. The method will allow assessing the real solvency of the enterprise, since when calculating it, the individual characteristics of the company's activities are taken into account. Timely and reliable accounting of the level of solvency will allow the company to react to the lack of funds in time, to avoid bankruptcy and increase the investment attractiveness of the company. This will increase the efficiency of company management and ensure the attraction of borrowed funds to expand the company's activities on favorable terms for the company. These opportunities are very important for the enterprise, because their future development and stability in income depend on them, and every entrepreneur is interested in this.

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Entrepreneurial Self-Efficacy and the SHAPE Ideation Model for University Students

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Abstract: Entrepreneurial Self-Efficacy (ESE) relates to the confidence levels and introspective journey of individuals en route to entrepreneurial action. Learning and fostering ESE are essential aspects in an attempt to bridge unemployment gaps. Creating entrepreneurship education approaches to boost both ESE of students and meet the demands of the future world of work is a key focus area of South African higher education institutions. Tailoring pedagogy for students to learn elements of entrepreneurship affects graduates' total entrepreneurial activities, and in return, national socio-economic development. This study gives account on the case of shifting hope, activating potential entrepreneurship (SHAPE) as a social technology and how it can be applied to boost ESE propensities of university students. A close-ended ESE survey was deployed three times to a sample of university students over a period of nine months, Pre-, During-, and Post-SHAPE. It was found through a repeated measures analysis of variance that there was a statistically significant mean difference between the different stages, confirming that ESE propensity development of the sample occurred over time. This finding lead to creating the novel SHAPE-Ideation model in retrospect to illustrate the different entrepreneurship education approaches applied in this case to effectively boost ESE. The SHAPE-Ideation model can be applied as an entrepreneurship learning enhancement tool by educators, trainers, facilitators and mentors when designing an ESE learning experience for students.

Keywords: entrepreneurial self-efficacy, action learning, training, SHAPE, entrepreneurship education, intention

1. Introduction

Empirical evidence has shown that entrepreneurial education and training has influence on entrepreneurial self-efficacy (ESE) as a requisite to separate entrepreneurs from those who do not have intention to create a venture or business (Chen, Greene & Crick, 1998). While entrepreneurship education could be regarded as an effective drive in developing entrepreneurial self-efficacy and consequently changed the learners behaviour to act upon their intention to create venture. This has not been able to grow Total entrepreneurship activities (TEA) or produced concrete results (Naktiyok, Karabey & Gullucee, 2009) and failed to enhance the youth entrepreneurship to the expected level (Ghina, 2014; Baijnath, 2015). Therefore, developing entrepreneurial self-efficacy could enable learners to put more efforts over a long time, persist the challenges and develop plans and strategies to accomplish higher entrepreneurial goals (Shane, Locke & Collins, 2003). Scholars have looked at students' entrepreneurial capability development through different lens; through life-story process (Rae & Carswell, 2000); through theory U (Van der Westhuizen, 2016), and through transformative learning (Nyamuda, 2018), the scholars argued that learners' self-confidence and self-belief in ability to accomplish given task is highly affected by active learning, social technology, known capabilities and personal theory. It was further argued that entrepreneurial education should not only be focused on technical aspects of theoretical/abstract learning of entrepreneurship, but how to develop and strengthen learners' self-confidence to become entrepreneurs through acquisition of required skills (Zhao, Seibert & Hills. 2005) as embedded in self-efficacy element by Barbosa (2007) through action or systemic learning.

Numerous scholars in the field of entrepreneurship opined that entrepreneurship can be taught (Oliveira, Fazion & Alfonso, 2013; Azim & Al-Khatani, 2014). The debate about how best to impart the necessary skills to the potential entrepreneurship students is ongoing, as the best way to do it is yet to be identified. Extant literature emphasises that entrepreneurship education require learning systems other than the traditional method on the premise that self-confidence can be developed through teaching and learning the ability to tackle the rigors of venturing into a new start-up. Hence the importance of introducing the development of entrepreneurial self-efficacy in the entrepreneurship curricula (Bandura, 2010). Through this development, appropriate curricula will be designed and conceptualised to provide the theoretical foundation for entrepreneurship studies. This could enhance the success of teaching and learning by influencing individuals' self-capability along different dimensions of entrepreneurial self-efficacy (Ndinguri, Philips & Prieto, 2014).

ESE was simply defined as entrepreneurial features in oneself that are inspired by one's ability to decide on a goal and complete a task with a degree of creativity that informs economic action (Sahin, Karadag & Tuncer, 2019). The reflection on the global lockdown and Post-Covid-19 pandemic era has revealed many challenges in the world economy and how it affects local economy and the manpower service delivery. Therefore, it beholds on the nations of the world to build the economy in line with the technological advancement in relation to the fourth industrial revolution and work-life balance strategies for continuous business, services delivery and optimal organisational performance (Ganiyu, Fields Atiku, 2018). This will enhance and aids work at home strategy as reflected on the organisations that have incorporated the strategy into their organisational work plan. To address this notable challenge and its impact on the developing nations economy, entrepreneurship self-efficacy of the people needs to be developed in relation to other economic sector. The focus could be directed to entrepreneurship education in the higher institutions by enhancing the ESE propensities of the learner to act on their intention.

This study reviewed "Shifting Hope Activating Potential Entrepreneurs" (SAHAPE), builds on the previous study by Van der Westhuizen (2016) (SHAPE Training Project) that examined; "Developing individual entrepreneurial orientation: a systemic approach through the lens of theory U". The study concluded that there was a significant and radical development of the participants' individual entrepreneurial orientation. Despite this fit, South African adult total entrepreneurial activities are still at lower rate because 55% and 58% rarely sees opportunity and if sees a profitable opportunity they fail or rarely act on it respectively (GEM Global Report, 2019/2020). This could be as a result of systems disconnect or lack of entrepreneurship self-efficacy propensities and development of the youth within the age of 15 and 34. It could also be lack of entrepreneurship discipline or outdated entrepreneurship curricula in some higher institutions of learning that produced working age group into the system resulting to searching for blue chips job that are not enough. One possible best way to address this challenge before it deteriorates to the abysmal level is to build on the previous study and improve on the method. This could produce a significant and developmental result on Individual Entrepreneurial Orientation (IEO) and build learners Entrepreneurship Self-Efficacy of the student and youth in both formal and informal learning. The study therefore in collaboration with SHAPE social technology (youth training project) reviewed the learning process and explored the facets of entrepreneurial self-efficacy and how student entrepreneurs can be equipped. This is in a bid to develop and activate their individual entrepreneurial orientation to undertake entrepreneurial action pertaining to business start-up and growth. It therefore formulated the following objectives, research questions and hypotheses thus:

2. Objectives

- To determine the effect of SHAPE social-technology on students' entrepreneurship self-efficacy development over time.
- To examine the progressive development of students' entrepreneurship self-efficacy over time.

3. Research questions

- How does the SHAPE social technology affects students' entrepreneurship self-efficacy over time?
- Is there a progressive development on students' entrepreneurship self-efficacy over time?

4. Hypotheses

H1: *There is no significant effect of SHAPE social technology on students' entrepreneurship self-efficacy development over time.*

H2: *There is no statistically significant mean difference of students' ESE development between stages over time.*

5. Concept of self-efficacy

Self-efficacy (SE) refers to the ability to enhance motivation, material and cognitive resources and take the action needed to decide over an event (Bandura, 2010) and significant factors for entrepreneurship. It is the main characteristics in numerous psychology theories, some of which pertain to motivation, thought patterns, cognitive process, future orientation and everyday behaviour (Tian, Zhang & Atinc, 2016). The confidence in self-efficacy enables a level of aspiration, consistency and achievement of goals and objectives (Brown & Lent, 2016). Self-efficacy can be built by means of receiving information and processing it for the successful performance of a profitable task. According to Weinberg (2020), this refers to a neurological process that supports consciousness

and emotion working within the human brain. Although the process is complex, there is relative functionality that integrates and relates to self-efficacy through the fundamental functions of memory and recall, emotion and motivation. Arnsten (2009) refers to this function as motivation and working memory; an abstract sensory memory association that integrates information at an elevated level as a driver of conscious action in a part of the brain known as the thalamus. The thalamus serves as a relay station connecting all the systems throughout the entire body (Mai & Paxinos, 2011). The thalamus is more than a relay station if considered in the field of learning and entrepreneurship, as this is where the subjective consciousness resides and is connected to the hippocampus that supports the valuable short-term memory function. This is related to an element of entrepreneurship self-efficacy where individuals search for opportunity and creative information and filter these through higher-order neurons in which individuals synthesise the perceived information (Fellemen & Van Essen, 1991).

6. Entrpreneurial Self-Efficacy (Ese)

ESE is the way one perceives one's ability and tendencies to identify, innovate and develop the intention to create and manage a business, which affects one's belief regarding whether or not the set goals will be met (Newman, Obschonka, Schwarz, Cohen & Nielsen, 2019). Bandura (2012; 1997) defines entrepreneurial self-efficacy as a social learning theory; one's ability to perform a given assignment. Dmovsek, Wincent and Cardon (2010) define ESE in two dimensional ways; one's belief to achieve goals, desire outcomes, and ability to control dysfunctional thoughts during period of failure, as these factors enhance the cognitive control belief. Slavec and Prodan (2012) posit that students' entrepreneurship self-efficacy to perform entrepreneurial roles and tasks can be developed by action learning, attending entrepreneurial workshops, training, seminars and simulation workshops. It means that ESE development assists one to identify opportunities, acquire skills and knowledge, make decisions, learn from mistakes, establish and sustain a business. It also avails students the privilege of exploiting resources for entrepreneurial action by searching, planning, marshalling and implementing human and other resources (Karlsson & Moberg, 2013). The entrepreneurship action which can be likened to going into the battle in terms of risk involvement in which student entrepreneurs need to be exposed to various pedagogical methods to obtain the required skills to thrive in an unstructured environment and successfully address any challenges they encounter (Ker, Ker & Xu, 2017). Specifically, ESE could be considered as prerequisite needed for potential entrepreneurs' engagement in entrepreneurship activity (Sahin, Karadag & Tuncer, 2019) which will show important entrepreneurial activity (Sahin, Karadag & Tuncer, 2019). It therefore can be regarded as the antecedent of entrepreneurship intention (Deliana, Rahardjo & Afriyanti, 2019) which needs to be learnt through different pedagogical methods.

7. Entrepreneurship pedagogy

Entrepreneurship pedagogy is an extension of entrepreneurial education that challenges educators to design an acceptable opportunity for students to study entrepreneurship in higher institutions of learning (Lackeus, 2015). Scholars are of the opinion that the emphasis should be on individual entrepreneurship learning rather than on group activities that will be relatively unstructured (Bell, 2015; Alves, Fischer, Schaeffer & Sergio, 2019). Entrepreneurship pedagogy identifies challenges and presents acceptable solutions under conditions of ambiguity and risk, an environment that is unstructured in which students are expected to thrive (Linan & Fayolle, 2015; Graevenitz, Harhoff & Weber, 2010). Most of the universities that run entrepreneurship programmes are challenged to focus on three significant areas for the development of entrepreneurship based on the global trend and as enshrined in the development strategies of the EDHE in South Africa. Globally, entrepreneurial pedagogy includes a) entrepreneurship education, b) outreach activities and c) entrepreneurship research (Matlay, Maritz, Jones & Shwetzer, 2015) while in South Africa, it includes: a) student development, b) staff development and c) programme or curriculum development.

There is a need for the interface between entrepreneurship and pedagogy to be broadened so that entrepreneurship learning is based mainly on creativity and innovation approaches rather than traditional teaching methods (Istance & Paniagua, 2019). It has been revealed that learning entrepreneurship is dependent on the applied pedagogy but educators are still applying conventional teaching methods that provide an understanding of entrepreneurship education's purpose, entrepreneurial learning and its process. Its clarification will help practitioners to reflect on and renew their teaching methods bearing in mind that pedagogy is the best way in which knowledge can be imparted during teaching and learning. Thus, for any educator to embrace the 21st century's technological advancement in teaching and learning, there must be competency in

the use of various technologies for the expansion of pedagogies so as to instil creativity and innovativeness on the learners of entrepreneurship (Istance & Paniagua, 2019).

8. 'Shape'

The acronym stands for "Shifting Hope, Activating Potential Entrepreneurs" (SHAPE). This initiative was founded in 2014 by Thea van der Westhuizen, at the University of KwaZulu-Natal. It is referred to as a social technology that can be seen both as a 'systemic-action-learning-action-research' methodology (SALAR) and a theoretical framework that serves to develop an individual's entrepreneurial spirit. This is a process of moving from reactive thought processes to generative processes, thereby allowing the ideation of entrepreneurial opportunities to be activated (Van der Westhuizen, 2019). The focus is on developing student entrepreneurs to bring students, the youth and stakeholders together for learning and networking. Here, the SALAR training project is offered with a focus on growing the national economy and building confident entrepreneurs. The second edition of the project, SHAPE 2017 serves as the study site for this research.

9. Research methodology

Quantitative: A mono research design was adopted for this study to make scientific inquiry which has its root in the positivism research paradigm (Tuli, 2010). The adoption of quantitative design is considered suitable for this action research to measure an amount (Hagan, 2014) while data analysis is presented in numerical form (Punch & Qancea, 2014). The quantitative approach is used to elicit first-hand information from the participant, test the hypothesis and make inferences on the relationship that exists between the base of the observed variable base on the statistical inquiry where the decision to accept or reject the hypothesis is tested (Bell, Bryman & Harley, 2018).

9.1 Population and sample

The study focuses mainly on third-year entrepreneurship students at the Westville campus of the University of KwaZulu-Natal, South Africa. The research was conducted in collaboration with the SHAPE 2017 training project which spans over a period of thirteen weeks in the second semester of the academic session. The target population of this study is the self-selected volunteered participants of the training project that are presumed to have acquired entrepreneurship knowledge in their traditional learning and are ready to develop their entrepreneurial self-efficacy. The research incorporated all the volunteered registered participants as the study sample population that was purposively selected. 230 questionnaires were distributed in three rounds periodically in the training (Pre, during and Post-Shape) with the help of the training coordinating team. In the end, sixty (60) consistent participants' response were analysed to know the progressive transformation and development of the participants' ESE and the effects of SHAPE social technology in their behaviour to learning method.

9.2 Measurement

The research questionnaire made use of a seven-point Likert scale (From 1= not confident; mostly not confident; somewhat not confident; undecided somewhat confident; mostly confident and 7= completely confident) to elicit information on the effect of the SHAPE social technology training and learning method on students' entrepreneurship development. Close-ended questions were used to elicit demographic information. The instrument was piloted during the entrepreneurship class in the first semester of the session to test its reliability and all errors detected were corrected. Data were analysed using descriptive statistics as well as inferential statistics most especially Pearson Products Moment Correlation (PPMC) and repeated measure of analysis of variance.

10. Results and discussions

230 questionnaires were administered to the training participants, however, only 60 of them consistently attended all the training sessions. Data analysis was based on the participants that took part in all the training sessions in line with the objective of the study which is; to examine how SHAPE social-technology develop students' entrepreneurship self-efficacy over time, and to examine the progressive development of students' entrepreneurship self-efficacy over time. 60% of the population accounted for female participants while 40% were male, which is consistent with a similar study where female participants were 70% more than the male counterpart at 30%; and female 65% and male 35% respectively (Van der Westhuizen, 2016; Nyamuda, 2018). It is consistent with student gender composition in South Africa at the time of the study. N=56 (93%) and N=4

(6%) were students and non-student participants respectively. The non-students were included based on special request from the sponsors of the training project. 33 (63%) were black South Africans, 2 (3.3%) were coloured, 16 (26.7%) were Indians, 9 (15%) were from other African countries; according to the racial distribution of the participants. N=38 (63.3%) were degree holders, 16 (26.7%) were Matric holder and N=6 (10%) had a postgraduate qualification. This suggests that entrepreneurship skills acquisition and development are gradually gaining momentum, building capacity and seen as push and pull factor for entrepreneurship action. N=53 (88.3%) and N=7 (11.7%) lives in eThekwini Municipality and other provinces respectively. It was observed that fewer number of participants were consistent throughout the program. This may not be unconnected with the distance covered by the participants, the clash between the lecture hours and the training time, and the change in the venue sometimes.

10.1 Analysis and discussion of findings

Table 1: shows the effect of SHAPE social-technology as it developed students' entrepreneurship self-efficacy propensities over time (round one to three).

Table 1: Regression analysis shown SHAPE social technology and ESE development (Rounds 1-3)

VARIABLES	ROUNDS	R	R SQUARE	ADJUSTED R SQUARE	F	BETA	T	P
CONSTANT	ROUND 1	.583a	0.340	0.325	21.664		11.214	0.583b
ESE						0.583	4.654	0.000
CONSTANT	ROUND 2	0.519a	0.269	0.251	14.732		9.263	0.519B
ESE						0.519	3.838	0.000
CONSTANT	ROUND 3	.505a	0.255	0.237	14.045		7.435	0.505b
ESE						0.505	3.748	0.001

Table 1 presents the regression model and in Round 1, ESE indicated an R square of 0.340 and adjusted R square of 0.325. The model indicated that SHAPE social technological training project employed predicted 32.5% of the variations on the participants' ESE in the training project. There was a significant relationship (at $p < 0.001$) between the SHAPE social technology and ESE progressive development over time. In Round 2, an R square of 0.269 and adjusted R square of 0.251 obtained indicated that the model predicted 25.1% of the variation in the participants' ESE during the training project and also indicated that there was a significant relationship between SHAPE and the constructs at $p < 0.001$. Round 3 indicated an R square of 0.255 with adjusted R square of 0.237, which indicated that the model predicted 23.7% of the variation in the participants' ESE in the training project and that there was a significant relationship between the constructs at $p < 0.001$. The results obtained in the three rounds revealed that the SHAPE social technology enhanced progressive development from Round 1 to Round 3 of the project in support of the hypothesis that there was a significant relationship between ESE and IEO development in Round 1 to 3. The standardised Beta and corresponding P values for SHAPE social technology and ESE in the three rounds were $\beta = 0.583$, $p < 0.001$; $\beta = 0.519$, $p < 0.001$ and $\beta = 0.505$, $p < 0.001$ respectively. This made a positive contribution to the training model.

Given the significance of each round of the independent variable used, the result revealed t-statistics at $t = 4.654$, $p < 0.001$; $t = 3.838$, $p < 0.001$ and $t = 3.748$, $p < 0.001$. This indicated that SHAPE social technology as a variable positively affected the participants' entrepreneurial self-efficacy propensities to be innovative, creative, launch a business, grow and sustain the business upon graduation. The research objective that aimed to determine the effect of SHAPE social technology on students' entrepreneurial self-efficacy development over time was achieved. The result of the regression model revealed that there was a correlation between SHAPE social technology and students' ESE propensities as reflected in the training project. On this basis, it could be concluded that employment of suitable training method could serve as predictor of learners' ESE propensities development and results to entrepreneurship action.

To meet objective two of this research, analysis of variance was employed using a repeated measure based on the longitudinal nature of the training and to know at what point changes, development and degrees it occurs. Table 2 depicted participants' progressive development using analysis of variance to determine changes, development stages in the learners' ESE propensities over time which shows that learning took place in the training session.

Table 2: Repeated measure analysis of variance

ENTREPRENEURIAL SELF-EFFICACY	MEAN	SD	N
ROUND 1	4.2445	0.83305	55
ROUND 2	5.0473	0.84540	55
ROUND 3	5.5209	0.93057	55

Table 2 revealed the mean according to the progressive development effected by the social technology employed for the training in the longitudinal study from round one to three on the students' entrepreneurship self-efficacy propensities. This is reflected in their behavioural change and individual personal traits to entrepreneurship development. It revealed the mean score with progressive development from Round 1 to 3; at (M = 4.248, SD = 0.900), (M = 5.086, SD = 0.872) and (M = 5.478, SD = 0.875). The training indicated a significant development on entrepreneurship self-efficacy and informed the transformation through the application of SHAPE training project and the five stages of Theory U from Round 2 to Round 3 to develop the participants' ESE propensities. It revealed that classroom teaching was used as a foundation of the training programme affirming the nondualism of the systems, hence the median choice of undecided, which was mostly recorded in the first round of all the constructs. This is because of little knowledge of what entrepreneurship means to students after being exposed to classroom teaching. The training developed and exposed the students to practitioners who employed different learning pedagogies in the hub that shows the result from Round 2 to Round 3 for innovation and creativity.

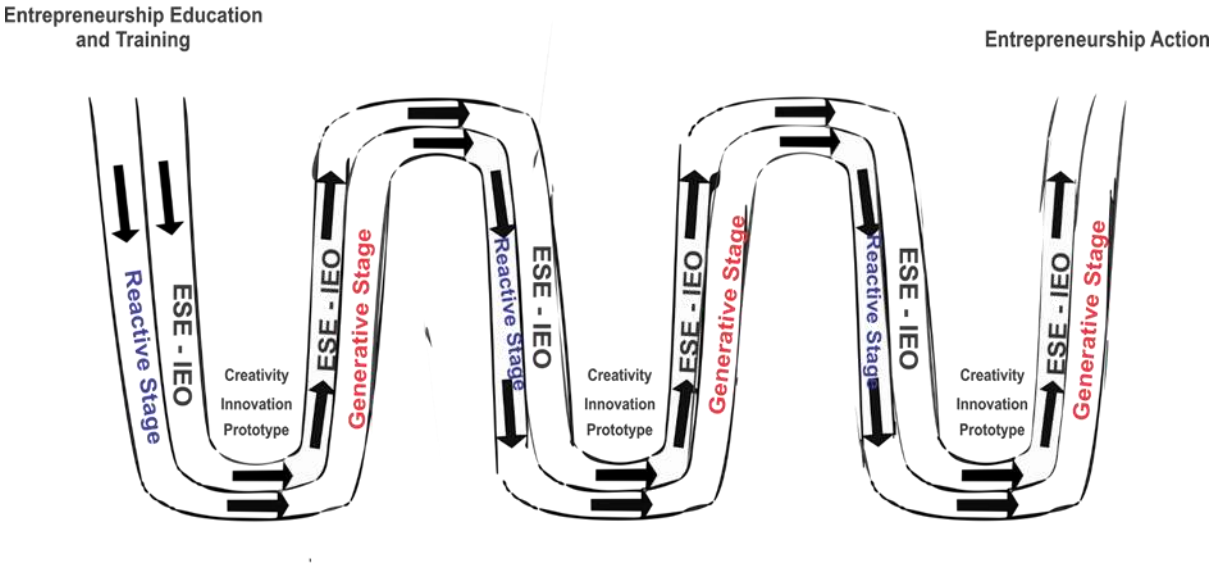
10.2 Findings

Based on the analysis, it was found that the SHAPE social technology engaged systemic learning with different focus, content and expected output. It was discovered that the SHAPE learning pedagogy was much more valuable than the traditional learning method considering the training content, methods of skill impartation, medium and the result. It was revealed that the student propensities improved from round two to three, this is as a result of the action learning that availed them the practical experience of what doing business implies and that self-efficacy is part of entrepreneurship propensities and pull factor for doing business. It is worthy to note that with numbers of years of student learning about entrepreneurship in the university, production of the graduates was for self-development that leads to searching for employment after the completion of the study as a result of lack of ESE. This is a contributing factor to the rise in youth and graduate unemployment level of the nations of the world. This is consistent with the views of Ghina (2014), and Baijnath (2015) that the traditional teaching method does not give an expected result of entrepreneurship action thereby producing graduate job seekers which negatively affects South Africa employment rate.

It was found that learners were interested in creativity and innovation which led to the volunteering to develop their ESE because of the action learning employed. It implies that there is a relationship between systemic action learning and learners' progressive development and entrepreneurial action. This is consistent with Kariv, Cisneros and Ibanescu (2019) that entrepreneurship needs be taught 'entrepreneurially' especially in academic learning or training program with more systemic approaches which will intertwine entrepreneurship with the educational foundation to harness developments in education and entrepreneurship. Scholars have also argued that there should be a paradigm shift in entrepreneurship education transmission method (Learning 'about') to action learning (Learning 'for') to offer students the skill that suite the real-world practice of entrepreneurship (Hermann & Bossle, 2018). It will engage hands-on learning that instils confidence (can do spirit) and change the efficacy of individual learner to act on their entrepreneurial intention. It is exploitation on initial experience which is the take-off point in action learning method (Clark, 1994). The learning process encourage the nascent entrepreneurs to build and engage more actively in entrepreneurship training for effective start-up (Nikou, Brannback, Casrud & Brush, 2019).

It is worthy to note that to achieve a better result in developing ESE, no method should be left out. Application of the Shape ideation model revealed that there was a significant progressive development to maturity over time; this is consistent with the Transformative Learning Centre (2016) that fundamental shift must occur in different premises of thought, behaviour and action that will irreversibly alter ways of being. The significant development to maturity which led to identification of seventy-three participants who are ready for entrepreneurship action is consistent with progressive development described as development to fruition by Murray and O'Fallon (2020) and provided developmental experience (Al-Qahtani & Higgins, 2013) among the training participants.

The systemic action learning action research engaged in the training implies that no part of the system can forge ahead without the support of the other as in the traditional method that serves as a basis for other entrepreneurship pedagogy. For this, the authors developed a training model 'SHAPE-Ideation model' to enhance progressive development of learners applying nondualism concept with theory U for action on potential entrepreneurial intention using longitudinal study. Figure 1; shows the model as it applies to training and development incorporating systems in its application such as context, content, academia, practitioners, students, school and government. The incorporation of systems is consistent with the views of Larty, Friesl and Jack (2012) that combination of networks of practitioners and intermediaries' builds innovation, creativity and networking amongst the participating systems to develop ESE. Figure 1 is the SHAPE-Ideation model developed and applied for this training as an ideal social transformative technology that could develop the future leaders and provided them with the necessary skills as shown in this study.



SHAPE-Ideation model (authors compilation)

Figure 1: SHAPE-Ideation model

Figure 1: Shape-ideation model shows new pedagogical method of training as alternative to traditional teaching method. The model shows spiral dynamic movement of constructs development with the content of the study. The loops revealed that none of all the concern systems in the ecosystem can be left out in-terms of progressive development which includes learners, trainers, context, technology and government. It also shows that development is progressive through learning, identification of gap, proactivity in action, innovation and creativity development. In the systemic action learning, the principle of teaching reveals that learners do not learn abstract or theoretical knowledge only but how to simply deal with entrepreneurship tasks. It is worthy to note that the action learning principle is based on scientific knowledge and not derived from individual experience because it contributes to the success of entrepreneurship and its management. The principle ensures learning by doing so that the learner will not be a passive recipient of training content but actively perform the target behaviour through the interaction with co-learners or group in the reactive and generative stages. Such a simulation group of learners will be required to propose a business model canvas during the course of study in the college with support from the school (Westhuizen, 2016). This is attributed to factors that can influence the success of the teaching and learning from three different perspectives; the student, the educator and the society (Stronge, 2018). This implies that the operating unit of learning in entrepreneurship cannot function in isolation but needs others to thrive most especially when learning involves giving instruction either by programming in a certain technology or a passive way (Van der Westhuizen, 2016).

11. Limitations of the study

This study is not without its limitations. It reviewed the literature on entrepreneurship education and entrepreneurship training, and entrepreneurship development training (SHAPE 2017) to examine if the social technology has a significant impact on student's entrepreneurship self-efficacy development over time. Further research should expand on the training and also apply SHAPE-ideation model to confirm its validity for developing potential entrepreneurs for venture creation. The study was limited to UKZN and the analysed

sample was another limitation as a result of the nature of the study and the objectives, further research is encouraged with a large sample to validate this result. Further studies should also be conducted in different universities to validate the findings of this study and generalisation. Finally, future research should focus on the sustenance and growth of the established venture which could be a longitudinal study to be able to capture the challenges and feedback on the growth and development in the entrepreneurship ecosystem.

12. Conclusion and recommendation

This study is a review of entrepreneurship education and training methods in South African university to identify and suggest training methods for imparting entrepreneurship skill to the student as a model that can be incorporated into South African Universities curriculum. Having reviewed literature on entrepreneurship education and SHAPE training project with a focus on its influence on learner's entrepreneurial self-efficacy, behaviour and development to engage in entrepreneurial total activities. It was found that entrepreneurship education is ineffective to transform the learners to give the expected result of becoming a nascent entrepreneur or create a venture (Ghina, 2014). This study was able to establish that systemic action learning is an efficient method for promoting entrepreneurship development and venture creation as demonstrated during the SHAPE training project 2017 at the University of KwaZulu-Natal. It shows that the traditional method, because of outdated curriculum, non-availability of technology and qualified teachers only develops leaners for the acquisition of degree and to become intrapreneur and not to be self-reliant. Extant literature was reviewed and attempts were made to effectively apply SHAPE-ideation model with theory U which can be used to tackle the menace of producing graduates without the skill to identify business opportunities that will assist them in venture creation. The study therefore, recommends the overhauling of entrepreneurship curricula to accommodate the learning model tailored and focused on innovation, creativity and entrepreneurship development in all university's discipline. The study also suggests that entrepreneurship curricular is avidly restructured by University academics and management in line with innovation and creativity for entrepreneurship development action. More importantly the SHAPE-Ideation model can be applied as an entrepreneurship learning enhancement tool by educators, trainers, facilitators and mentors when designing an ESE learning experience for students. It is hoped that this study will encourage both trainers and learners as well as guide the policymakers in the promotion of entrepreneurship policy design and delivery process of entrepreneurship training.

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Resistance to Digital Transformation and the Destruction of Social Capital

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Abstract: When a Russian transportation company decided to convert into a platform business to increase its efficiency and to win back market share, it was confronted with high levels of middle management resistance. This paper studies the reasons for this resistance and how the company succeeded in overcoming it by using the work of the French sociologist Bourdieu. Based on interviews and the study of internal documents, this paper presents eight cases of middle management resistance and draws conclusions on what other organizations can do to alleviate similar situations. Social capital was originally built through strong ties in intra-group cohesion. The new platform business though required weak ties throughout the firm became of interest. The paper shows that most resistance is attributable to an immediate loss in social capital that the company failed to rebuild. Still, the decisions taken by the change management team or their decision to accommodate resistance behaviour rather than confront it, led to the creation of a new form of social or cultural capital.

Keywords: social capital, digital transformation, digital platforms, employee resistance, innovation, readiness for organizational change

1. Introduction

This paper thematizes emerging resistance to change after management rebuilt the organization towards a platform business. Thereby, the company – a Russian transportation service provider – embraced digital technologies in an attempt to increase its efficiency and to win back market shares. The firm though had regional business units throughout Russia's vast territory, which were accustomed to a very high degree of freedom in doing business. Most prominently have managers established preferential contacts with individual haulers which now had to follow enterprise-wide rules imposed by the underlying information system.

Business models in general and digital platforms, particularly due to their open nature, have been described as a complex activity involving various actors (e. g. Kolloch & Dellermann, 2018). The concept of business model transition has been under-researched, especially in the light of emerging digital platforms. Change processes of such a nature have previously been identified as a major reason for resistance to change by a firm's staff (e. g. Rafferty et al., 2013).

The framework against which we analyze the sample case grounds in the work of French sociologist Pierre Bourdieu. His analysis builds on the concept of capital, which individuals have gained throughout their lives from accumulated labour. Organizations, in Bourdieu's sense social spaces that follow their own set of rules, have demand for different forms of capital, and possession of these forms of capital defines the roles actors hold in this social structure. Due to organizational change, the demand for capital is changing, which results in – sometimes painful - adjustment processes and open resistance to the same. The research on the importance of social capital in organizational research is growing fast, and especially the innovation literature treats social capital a conditio sine qua non. What is missing though is the question how the company is affected if social capital is destroyed. This makes Bourdieu's work a probably underutilized lens to answer the two major questions of resistance research: Why should a firm expect employee resistance, and (b) what can be done to ease the situation.

2. Resistance to change

The literature on organizational development interpreted resistance to change either as a result of organizational factors or as an individual response to a potentially emotionally overwhelming and threatening situation and, thus, as an attempt to seek protection from these changes (Dent & Goldberg, 1999; Burnes, 2015). While some contributions see employee resistance as largely irrational, pervasive, and dysfunctional altogether (Choi & Ruona, 2011), Zwick (2002) pointed out that firms encounter higher internal resistance if change projects aim to increase efficiency instead of improving the quality of products or services. These thoughts also reconnect with the original findings of Coch and French's studies (1948), in which a firm frequently tampered with the

performance target of their mainly female workforce. Thus, resistance depends on organizational-procedural justice and its perceived fairness (Cohen & Keren, 2008).

Subsequent schools of thought interpreted resistance to change as a product of the social context in which it takes place (Dent & Goldberg, 1999). The view of resistance as a systemic concept which is now studied in the context in which the change occurs may well render useful insights (Burnes, 2015). This view of resistance stresses the role of the personal and the social spheres when explaining the actual decision to resist change (Oreg, 2006).

3. Bourdieu's social capital and resistance to change

According to Bourdieu (1977), each individual (actor) holds a certain social position in a social space, which is driven by access to capital resources (Bourdieu, 1986). Each space requires dominant forms of capital, and access to this type of capital indicates an actor's ability to shape the social space (Emibayer & Johnson, 2008). Over time, actors' social positions become internalised, promoting the development of shared subjectivities and cultures within an organisation (Meyer & Rowan, 1977). These social dispositions include shared stories, identifying categories, such as *us* and *them,* as well as shared perceptions of friends and foes. The sum of internal and external social dispositions that creates the thoughts and actions of a social agent is what Bourdieu (1989) defined as the habitus. The habitus is formed in an on-going process in which the social structure forms the actor – and the actor in turn shapes the social structures. Thereby, the social and the personal are converging and form the actor. Shimoni (2017: 264) proposes that the habitus is "a mirror image of the organization's symbolic and material social structures and therefore not only external to the individual but also internal, a cognitive structure that generates social agents' behaviours, including resisting behaviours". Key decision makers with access to key resources are able to reproduce their own habitus and will exercise control over major social relations (Nielsen, 1996).

The place that an actor holds in a system is also indicative of his or her ability to steer the development of the organization. Each social space has positions at the core of the field and positions at the periphery (Battilana, Leca, & Boxenbaum, 2009). Actors located in peripheral social positions are more likely to initiate change that diverges from existing practice, but lack the power to be able to drive that change.

4. Methodology

The company requested external help when middle management showed resistance to changes necessary for the business model transition. The first and the second authors were invited to help with the activity analysis and to provide support to the project management team. We started by gaining a profound insight into the company's activities and the plan of the change process. We met with the leader of the project team and after getting a deeper understanding of the situation we conducted in-depth interviews with key personnel (around 45 minutes on average). In this paper we present selected eight cases of middle management resistance in the company. Thereby, we provide valuable insights into different aspects of middle management readiness for change and resistance to change to digital innovation.

5. Cases

At one of the first meetings, the case of a head of the logistic department in the central region (case 1) came to the attention of the project management team. The performance of the department was above the company's average, and the manager was in good standing with the company's top management. She supported the change process and shared top management's view on the potential efficiency gains. Though she favoured a rather cautious policy of small steps as she was worried about the department's overall rating in the company. The process was rolled out though not at all done in a manner she had favoured. As a consequence, the performance of her unit was lowered and the manager started to initiate and orchestrate resistance among her team members. This quickly resulted in a generally negative attitude towards the change project throughout her entire department. The lady - who spoke with a loud and authoritative voice - set in an open plan office, which made sure that every team member could hear her opinion. Additionally, she would use the company email system to spread her opinion. The negative attitude towards change travelled quickly into other regional divisions.

Top management took notice of the resistance though decided against any action, especially as the manager never scaled her actions up or adopted active resistance. Thereby, she never really imposed a threat to the

change process towards the new strategy. In her team though she held a lead position, and when she voiced her dissatisfaction, her colleagues showed her loyalty and adopted her mindset. Due to her high levels of social capital within the company, a lot of time and training was directed to discuss with her and to convince her that after all, she and her team will master the new system. The overall rating of the unit increased even above the previous rating. Once the success of the project became clearer and insecurity vanished, she used her social capital to align her team back with the company's strategic vision and she became a central advocator for the firms' change process.

Another manager from the central region with vast experience in the industry was supportive of the upcoming changes to stay competitive (case 2). Within his division, the majority of work procedures in place were developed by him as he led this division from the very moment of its foundation which was the source of his social capital. The manager welcomed the push towards a digital platform, but only as long as they didn't interfere with his established principles of work.

The manager always presented himself as a change agent, while in fact trying to roll out his work procedures throughout the entire company in order to increase his social capital. These procedures though contradicted some of the imposed changes as intended by top management, which frequently led to heated debates in meetings. When his team members proposed to rearrange the work flow in line with top managements' orders, he resisted the change and insisted on his established procedures. The division's performance though remained on a fairly high level (albeit the growth rate was lower than the company's average), and top management let him prevail.

As not all activities were digitalized at the same time - the communication processes between hauliers and managers were still done telephonically. In a second stage though, the hauliers' communication was captured electronically, and the information system-imposed selection criteria for hauliers was made mandatory. The manager, after approving the "non-priority haulier" (choosing him to fulfil the contract over more suitable – according to the logics of IS criteria), was obliged to provide the prioritized haulier with another order within two days. He still circumvented the system and ensured that hauliers could still continue to do telephone conferences with the unit's head. The project management team flagged this fact as a major weakness and recorded numerous attempts of the manager to negotiate preferred conditions for a number of hauliers over the telephone line. When confronted, the manager blamed the bad IT knowledge of the haulier.

The manager benefitted from the structural component of his social capital as he was able to span networks and bring in experiences from other organizations with the company's hauliers in his region. His attempts to fence off the control through the IS could no longer be ignored, and the manager was asked to explain why he diverted from the company's processes. His true intentions to re-establish his way of doing business was revealed and he lost a great part of his social capital on the relational dimension as trust in him vanished.

These cases describe well-preforming units led by managers with very high standing. Though, also in remote regions, far away from the company's headquarters, managers saw the opportunity that the proposed changes offered. A manager in a region in the Far East (case 3) felt incapable to qualitatively develop his branch, since his region is the region of the "last mile". Competition for the few reliable hauliers is very high, and incoming traffic is much lower than in the central regions. The new system though allowed hauliers who have capacities on incoming travels to offer this opportunity through the company's platform. After the organizational change, the number of transports increased significantly. The division was unprepared to act accordingly and to make use of this opportunity.

The manager enjoyed only low levels of social capital and acted from a peripheral position in the network. He understood that this new opportunity would open up ways to improve his position in the social space and embraced the upcoming changes. Despite his positive approach to change and a resulting increase in the cognitive dimension of social capital, he failed to meet the core objective of the company – namely to access economic capital.

Other managers indeed managed to improve their position based on the organizational change (case 4). A manager with high social capital - all inter-department activities were established by her - and established a set of work principles that most other departments adopted – competed in a region with a very strong competitor. This kept the development of her division down, as the majority of the customers and hauliers worked with the

company's competitor. Under the established business model, it was not possible to change the situation for the better, and hence she became an active supporter of the digital platform.

Moreover, she supported the implementation of a new system in her branch and arranged training for her team. Thanks to her activity, the implementation of changes in the branch was made easy and the branch received a new impetus for development. The division's position in the region's market has subsequently strengthened. The division's elevated performance was well perceived by top management and the neighbouring region's branch was added to the regional managers' portfolio (head of the division where she was a head of logistics Department). The previous head of the neighbouring branch who has resisted the change has left the company.

During the meetings to discuss the worsening of units after the change process, a department manager stood out who showed a high degree of resistance (case 5). She was an informal leader of her «Коллектив» and was highly influential as an opinion maker throughout the entire company. She was opposing the change plans right from the start, but her opposition became fierce when her unit showed a really bad performance under the new regime. The manager invested a lot of time and energy to find various ways to circumvent the procedures of the information system, and she proudly shared her success stories among members of various regions. In fact, more and more employees started to follow her suggestions. The change management team had to react, but it was unclear how to change her mind. Then, the IT department communicated that they closed these blind spots that she had revealed. In fact, the IT department was working alongside her multiple attempts and found it helpful to identify weaknesses of the system. The manager was subsequently promoted to search for weaknesses in the new electronic platform. Thereby, she changed her perception and became a central promoter for the new business model. This gave her credibility and rose her social capital as top management started to appreciate the skills that she developed. This was again converted into higher social capital as she received a promotion to an elaborated position.

The case of the head of a regional division in the south (case 6) could not be brought to a successful end. He was acting in a very competitive environment, and he had already informed top management that the position of his division in the regional transportation market was weakening. He suggested a new pricing policy and lower entry requirements to contract in new hauliers. At the same time, when the process of implementing changes began, the branch's indicators actually began to decline. At the regular meetings to discuss the changes, the manager gave contradictory explanations for the lack of development of his division, often referring to the bad implementation strategy of top management, or the unwillingness of team members to use it, and the low motivation of employees in general. This raised red flags with the change management team. Over an extended period, the situation in the branch did not change for the better. The manager continued to blame the new IS, often with absurd requests like changing font size of the website. The project management team recommended that the CEO should replace the Head of this division, which he did eventually (although the CEO resisted this move for a long time as this manager was his protégé in the past). After replacing both the regional manager and the head of the logistics department, the new management more consciously joined the updated processes. Four months later (after the on-site training activities), the branch began to return to steady growth. A year later, the division performance only marginally lagged behind the leading region.

Another regional manager (case 7) was satisfied with the status quo as she had mastered the craft to optimize the performance indicators and was hence doing exceptionally well for herself. The regional manager grounded her success in the collaboration with "special treatment" hauliers. The introduction of a new information system was consequently a threat which she expressed at each meeting with her peer regional managers. The statements made though were abstract and not built on factual arguments. When the project management team asked to provide evidence for her claims, she refused to collaborate. In order to alleviate the situation, the manager received another branch. Striped of her personal connections with hauliers and forced to deliver results, the manager adopted the roles of the new system.

Though, not all resistance to change ended in such a manner. The division head did not see the need for any changes in the work of the branch, as under the old system she enjoyed a high standing as one of the most effective managers. The regional division was creating 75% of its revenue through one client, and thanks to this client, she was the highest paid head among the regional division. The introduced organizational change processes now changed this advantage, and the KPI system drastically reduced the manager's remuneration. Moreover, the transition to the digital platform and the change in the principles of work required this manager to develop relations with other clients of the region, which quickly revealed "bottlenecks" in the processes of

her division. Realizing the importance of a key client for the company to which she had a very close connection, she frequently threatened to leave the company. As the top management didn't give in to her threats but actually approved her wish to leave, she decided to stay on.

Nevertheless, she made a lot of efforts to maintain the previous work procedures. Due to her personal relationship with the CEO and her well-established relationship with the priority client, it was decided to increase this division's own fleet of vehicles in the region in order to keep the client. This approach also succeeded in ceasing the manager's resistance. Her refusal to take the final step and to leave opened up new ways to discuss alternative options. And indeed, due to her high relational dimension of the social capital through her connection to the main client – she could actually guarantee access to economic capital. In choosing a more amicable approach, she convinced top management to follow her suggestion and to give special status to her department.

6. Discussion

Unlike the cases in industrial firms in the 20th century that were driven by workers against management, the resistance cases of the digitalization age are likely to stem from middle management that fear losing their jobs or the reputation that is connected to their positions. The study field of resistance to digital transformation in companies is less a subject of technological applications but rather a topic for organizational development. The push towards digitalization and the conversion of a platform business rests on the streamlining of business processes. Routine processes will undergo major changes, repetitive activities become automatized, information travel freely within an organization. These developments change the roles, responsibilities – and the social capital endowment - of members of the organization. Due to the isolated ways of doing business by the company's units, most social capital was diverted towards strengthening intergroup connections. For the headquarters, the way how business was done in the region was of little importance, as long as the financial results were satisfying. It is hence unavoidable that social capital that is connected with former procedures will be destroyed. However, the company will have to find alternatives to rebuild social capital in order to avoid resistance.

Managers with a high social capital would not engage in resistance behaviour lightly. As shown in previous research, many employees act out of a deeply rooted believe that the proposed actions might not be the right decision for the organization. More training or mediation sessions can quickly clear up the situation and take uncertainty away. Such investments may convert key personnel with high social standing among colleagues quickly into change agents. As seen in our case 5, the manager geared up on her skillset in order to prove how badly executed the change process is. The firm realized that this resistance is in fact a valuable resource, and promoted her into a position to find flaws of the change process, especially the information system.

One option for the organization is to focus on these actors what will find themselves on the winning side and actively support the change process. In the case no 4, the manager came from a remote area, but quickly realized that the new organizational changes offered the economic setting for him to expand the firm's activities. The person indeed was subsequently rewarded with a promotion and a different region to manage. Such people that actively drive and support the proposed change are of utmost importance as change agents in early states of change. Especially the resistance cases as shown in case no 1 would require such agents to associate with the positive sides of the future outlook. Though, research has shown that positions in the periphery of a social space indeed take up such opportunities quickly, though they might not have the required abilities (Emibayer & Johnson, 2008; Battilana, Leca, & Boxenbaum, 2009). As shown in case no 3, enthusiasm and a valid business case does not guarantee economic success. Often, the sudden increase in business results in overwhelmed business structures and held up work-flows. Here, it would have been helpful to provide early stress-tests to the business units, especially when they had such a high degree of freedom as in the case presented here. In other instances, as presented in our last case, it might be senseful for an organization to allow deviations from the change process, especially if there is a good business case to support such a decision.

Such instances of resistance though will require tools that identify such cases and help to offer a solution. Here, the concept of social capital provides a very promising rationale, as demonstrated in this paper. Still, in order to convert Bourdieu's work into a practicable application that could be used to advise company decision makers, more work is needed. For example, could one's own perceived social capital be captured by a psychological test? If combined with quantitative methods of network analysis, the changes in social capital could be quantified – making it a preferred tool for compressed communiques with time-constrained top management.

Most likely, transformation driven by technology will become the new constant (Aldrich and Ruef, 2006). It is henceforward of great importance to generate social capital not only out of control over present processes, but out of mastery of change. Most companies don't have any reward system for successful participation in such activities in place. The analysis of processes that create social capital in transformation would offer a rich study field. Still, a focus on early signs of resistance might confuse resistance behaviour with actual meaningful critique on a digitalization strategy. Hence, it is vital to establish communication lines to ensure that critique can be voiced and is appreciated. In order to reduce the likelihood of resistance on a company level, it should be a priority to communicate the benefits – not only to the firms profit and loss statement, but also to the employees. Such statements on how all stakeholders benefit should be made a mandatory part of the firm's digitalization strategy.

7. Conclusion

This paper describes the resistance behaviour evoked by the transformation towards a platform business model of a transport company. Although the change process had to overcome lots of difficulties, the result proofed economically very successful. This makes the discussed organization standing out and well suited to draw suggestions for other organizations. Furthermore, the paper stands against the general trend in the literature to look into firms that are stuck in resistance or failed in their change process.

The paper presented eight cases of resistance and showed how the company answered. In most cases, the resistance was overcome, even converted into positive results. The analytical view on the presented cases of resistance shows how uniquely they all are interwoven in the events that accompany the change process. Despite the imperative to look at each case individually though, the concept of capital of Bourdieu – especially the social capital – proved very helpful as an underlying framework that does lend generalizability to the different cases. Bourdieu's concept of social capital is not only a snapshot in time. It is an indicator of personal and professional experience or skill sets acquired in their past professional and personal life worlds. They define the present-day capital and resourcefulness of a person. Thereby, this paper connects to the literature on individual psychological set-up that give rise to resistance and to the authors' earlier work, which studied personal and professional views of one's future and their role in explaining resistance to change (removed for review). Still, the research on resistance to digital transformation has only started very recently, and there is a lot to learn for organizational psychology. We outlined some questions we find of relevance in this paper, and invite scholars to contribute their understanding of the underlying processes.

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Transfer of Technologies by Russian Firms: Strategies and Connection to Regional Prosperity

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Abstract: The paper analyzes the strategies of Russian regional firms related to the transfer of technology. Technology transfer can be an essential driver of innovative development and contribute to sustainable economic growth. Technology transfer is usually understood as the application of technologies, methods, and knowledge developed by other organizations. Often, the active participation of enterprises in technology transfer reflects the features of their innovative behavior and the chosen strategy of innovative development. The paper analyzes the activity of Russian regional firms in technology transfer and the relationship of technology transfer and adaptation with the results of innovation activity. The results of innovation activity are understood as its scale and the quality of innovative products assessed based on market and technological product novelty. The paper considers the GRP per capita indicator as an indicator of regional well-being. The number of technologies transferred and adopted by firms and transfers from abroad of the Russian Federation is analyzed. Besides, the propensity of enterprises to interact with foreign partners in research activities is taken into account. The clustering of regions is used to identify the most widespread strategies. Clustering is conducted for three periods: 2016, 2017, and 2018. As a result, it was possible to identify five sustainable strategies of firms concerning technology transfer. Even though the strategies themselves turned out to be relatively stable, some regions are subject to strategy change, which is associated, among other things, with the cyclic nature of innovation activity. It should also be noted that the overall well-being of the region significantly influences the choice of strategy.

Keywords: innovation, innovative process, technology transfer, Russia, clusters

1. Introduction

Knowledge and innovation are key sources of sustainable competitive advantage in a global economy characterized by increasing competition and highly geographically fragmented production activities (Nolan and Pilat, 2016). The increased competition encourages companies to look for new solutions to achieve advantages. One of such solutions is technology transfer. Technology transfer can be an essential driver of innovative development (Allen et al., 2014) and contribute to sustainable economic growth (Hossain, 2012). Technology transfer is usually understood as the application of technologies, methods, and knowledge developed by other organizations (Melkers et al., 1993; Rogers, 1962).

In turn, international technology transfer, in which a party from one country gains access to knowledge whose source is in another country, is an crusial element of modernization and diffusion. Since there is a significant technological gap between firms from developed and developing countries (Fu and Zhang, 2011), international technology transfer is an important complement to the domestic sources of firms in developing countries (Grossman and Helpman, 1994). Adoption of foreign technology can play a key role in reallocating resources from less productive to more productive uses and facilitate economic and structural transformation, which has been identified as an important factor in economic growth in catching-up countries (McMillan and Rodrik, 2011).

Technology can be transferred in an embodied form, i.e., in the form of equipment or in an intangible form, which includes various knowledge and production methods (Teece, 1977). Different technologies may produce different results in terms of product quality, although they may also generate the same results at different costs. Innovation in this context can be defined as the development of new technologies that can create additional economic value (Kowalski et al., 2017). Thus, productivity, technology, and innovation are closely related.

A significant number of empirical studies are devoted to the relationship between research and development and technology transfer (e.g., Ferrantino, 1992; Hu et al., 2005). This relationship may be complementary or substitutive (Golichenko and Samovoleva, 2015). In some cases, technology acquisition contributes to the

growth of own research and development costs (Cassiman and Veugelers, 2006; Lokshin et al., 2007). At the same time, along with the impact of technology transfer on the innovative activity of the enterprise, there is also learning (Cohen and Levinthal, 1989) as a result of the application of external knowledge. Nevertheless, many studies have shown the negative impact of technology transfer on the activity of enterprises in conducting their research. This situation arises when R&D (Research and Development) and technology transfer have independent and similar effects on the knowledge base and enterprise productivity (Neelanjan, 2015). As a result, technology transfer can lead to the displacement of the internal development of the enterprise (Love and Roper 1999). At the same time, some developing countries have sought to strategically use international technology transfer policies as a development tool. For example, as a means of attracting investment and stimulating domestic innovation that can increase both the overall size of the economy and the value added per worker (Park and Lippoldt, 2008).

At the same time, a certain balance between internal and external sources of knowledge is necessary for successful innovation activities (Berchicci, 2013). The use of only technologies developed by other organizations can lead to a sharp decrease in the productivity and competitiveness of the enterprise (Grimpe and Kaiser, 2010). For this reason, among others, government policies in many countries are aimed at encouraging companies to conduct their research and development. The predominance of substitution or complementation effects is mainly due to external factors, such as the general level of wealth of the country or region and research potential (Golichenko and

Samovoleva 2015). Despite the broad evolution from restrictive to enabling policies for international technology transfer, some measures are seen as having a distorting effect on competition and have been criticized in the international context (Kowalski et al., 2017).

The paper aims to analyze the impact of technology transfer on the change in the activity of enterprises in conducting their research and development, taking into account the obtained innovation result. To answer this question, the first stage of the study analyzes the strategies of enterprises concerning technology transfer, depending on external factors. Then the connection of the obtained strategies with the activity of enterprises in carrying out their research and development is analyzed. Furthermore, as a result, the cumulative impact of technology transfer and internal research and development on the innovative activity of enterprises is analyzed.

At the first stage, the paper analyzes the activity of technology transfer of Russian regional enterprises and the relationship of technology transfer and adaptation with the results of innovation activity. The results of innovation activity are understood as its scale and the quality of innovative products assessed based on market and technological novelty of products. The second stage of the study analyzes the relationship between the identified strategies of technology transfer and activity in conducting R&D.

2. Data and research method

This paper uses data from the Russian Federal Statistical Service for 2016-2018 and data published on the official website of the Unified Information System for the Ministry of Education and Science of the Russian Federation.

To identify the most common strategies of technology transfer by regional enterprises, a clustering of Russian regions is carried out depending on the number of technologies adopted and transferred. Thus, clustering is carried out based on the following indicators:

- the ratio of the number of transferred technologies to the number of enterprises in the region (sold);
- the share of technologies transferred abroad (portion_sold);
- the ratio of the number of adopted technologies to the number of enterprises in the region (bought);
- the share of technologies adopted from abroad (portion_bought);
- the share of joint research and development projects with foreign partners (portion_RD).

Clustering was conducted three times, for 2016, 2017, and 2018, using the k-means method as the clustering method. Inertia methods, hierarchical clustering, and cluster silhouette coefficient analysis were used to select the optimal number of clusters.

As a result of the analysis for 2016, 5 clusters were obtained. At the first stage, to choose the optimal number of clusters, we considered the dependence of the sum of squares of distances from points to the centroids of clusters, to which they belong, on the number of clusters (see Fig. 1). Based on the dependence obtained, it can be assumed that the optimal number of clusters is from 5 to 7 since the decrease in the squares of distances with an increasing number of clusters decreases less intensively.

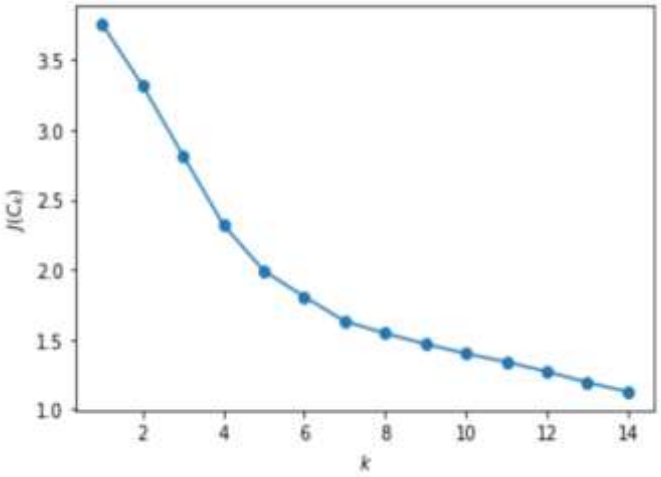

Figure 1: The dependence of the sum of squares of distances from points to cluster centres J(Ck) on the number of clusters k

Next, agglomerative clustering was carried out, and a dendrogram was constructed (see Fig. 2). In the beginning, each object was placed in a separate cluster, and then the clusters were merged into larger and larger clusters until all objects were in the same cluster. In this way, a system of nested partitions was constructed. The results are presented as a tree (dendrogram). Ward's method was used to estimate distances between clusters. As a result of the hierarchical clustering, it was possible to establish that a reasonable number of clusters is 4 or 5. If Ward's distance between objects does not exceed 1.5, the number of clusters is 5.

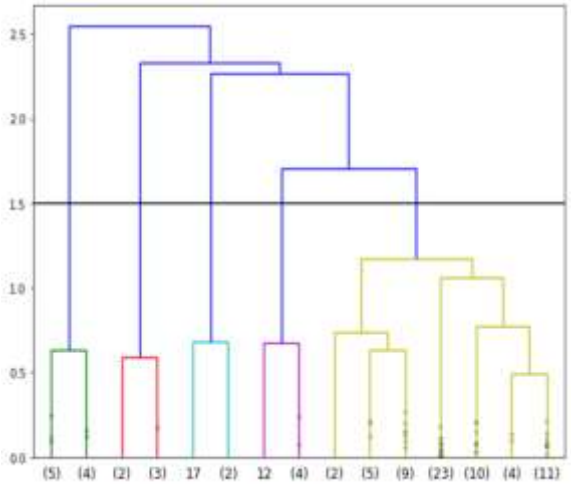

Figure 2: Dendrogram for hierarchical clustering, 2016

Also, to select the number of clusters, a silhouette coefficient analysis was performed. The silhouette coefficient is calculated using the average intra-cluster distance (a) and the average distance to the nearest cluster (b) for each object. Silhouette is calculated as (b - a) / max (a, b). In this case, b is the distance between a and the nearest cluster, which a is not included in. In the paper, the average value of the silhouette over all objects was calculated. This allowed us to use this metric to estimate the number of clusters. The value of the silhouette coefficient shows how similar the object is to the objects of its cluster compared to other clusters. The value of the index can range from -1 to 1. Analysis of silhouette coefficients for the different number of clusters showed that the optimal choice would be five clusters (see Fig. 3).

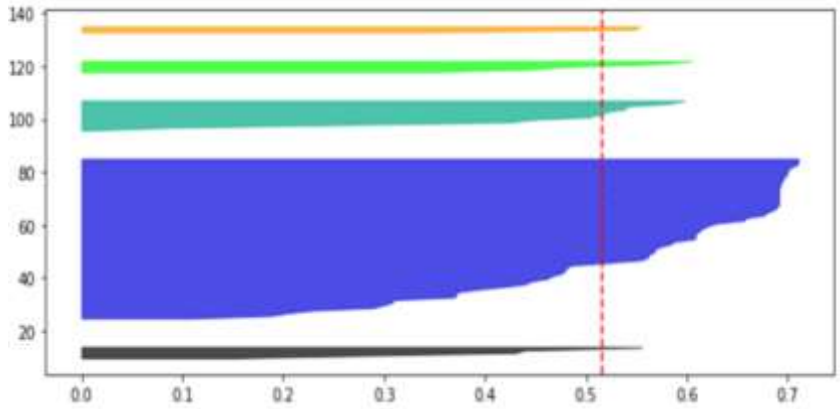

Figure 3: Silhouettes at k=5

Next, we clustered the regions of the Russian Federation by k-means into five clusters. The graph of average values characterizes the average values of the indicators for each cluster and allows a comparative analysis of clusters. The graph of average values is shown in Figure 4.

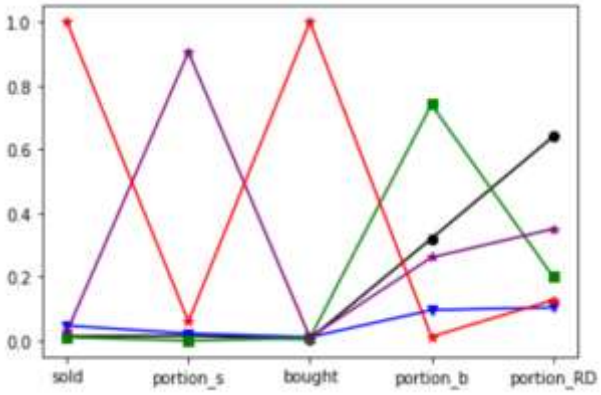

Figure 4: Graph of average values for clusters (2016)

The most significant number of regions is characterized by low activity in adopting and transferring technology (the first cluster). Nevertheless, some regions show different behavior. Thus, the regions of the second cluster tend to actively cooperate with foreign partners in research and development. At the same time, the number of technologies transferred and received is insignificant. The regions of the third cluster are characterized by their focus on the acquisition of ready-made foreign technologies with a small relative number of them. The regions of the fourth cluster sell a significant part of technologies abroad. At the same time, they are also inclined to acquire foreign technologies. The fifth cluster is characterized by many transferred and acquired technologies, and the transfer is carried out mainly within the country.

A similar way was used to cluster the regions by the same indicators for 2017 and 2018. It turned out that the average values of the clusters are almost unchanged, while their composition may vary. The exception is the second cluster, which does not stand out in 2017.

The paper considers GRP (gross regional product) per capita as an indicator of regional well-being. An essential feature of the distribution of GRP per capita by region (see Fig. 5) is the presence of several points, the values of which are significantly higher than the average. The regions with the highest values of GRP per capita are Sakhalin Region, Tyumen Region, Chukotka Autonomous District, Moscow City, Magadan Region, Republic of Sakha (Yakutia). For these regions, the share of sales of innovative products among all sales of enterprises is relatively low, which is primarily due to the scale of regional economies and the structure of production. For other regions, there is no explicit correlation between welfare and the scale of distribution of innovative products in the market and no correlation between the market novelty of products and the scale of their distribution.

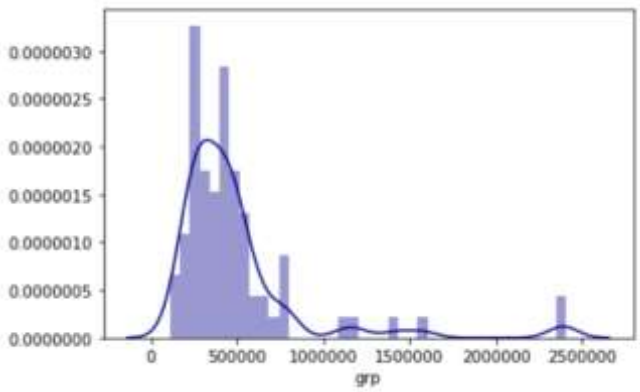

Figure 5: Histogram of the distribution of GRP per capita by Russian regions in 2018

3. The main features of regional strategies

3.1 Peculiarities of invariable strategies

The majority of Russian regional enterprises do not aspire to technology transfer. Such a situation can be connected with limited resources when the inflow of technologies, including abroad, is limited. Also, the companies possessing own sufficient resources can focus on their resources and create innovations without the attraction of outside organizations (Arkhipova et al., 2019; Balycheva and Samovoleva, 2019). Behavior characterized by low activity in the acquisition and transfer of technology is observed in the regions of the first cluster. In 2016, 64 regions belonged to this cluster, and in 2017 and 2018. - 59 regions each. At the same time, this type of behavior was unchanged in 41 Russian regions. For the regions that did not change their cluster affiliation during the period under consideration, the value of gross regional product per capita is 17% lower than the Russian average. Nevertheless, the standard deviation of this indicator from the average is quite significant, which confirms the assumption that despite the similar strategy concerning technology transfer, the reasons for not purchasing/selling technologies may differ significantly among themselves. At the same time, the scale of distribution of innovative products calculated as the share of sales of innovative products among all sales of enterprises is less than the average for Russia by 15%, and the share of new-to-market products among all sales of all innovative products is almost 2 times greater than the average (18.6% in 2018) (36.0% in 2018). Thus, significant indicators of the novelty of innovative products are achieved in this group, not due to technology transfer, including from abroad.

The most interesting are the regions of the group, the market novelty of innovative products that exceeds the average Russian values by more than two times. There are 15 such regions. Tambov Region, Krasnodar Territory, and Zabaykalsky Territory are examples. It may also be noted that the regions of the group with the highest wealth (Tyumen Region, the Sakha Republic) do not demonstrate high innovation activity. The share of sales of innovative products among all sales of regional enterprises is 3.3% and 0.8%, respectively (the national average being 6.5%), while the share of sales of products new to the market does not exceed 10% and 8%, respectively (the national average being 18.6%).

The regions of the second cluster are characterized by active cooperation with foreign partners in the creation of research and development. Besides, the region's enterprises tend to acquire ready-made technologies from abroad. For the regions following this strategy during the three years, the GRP per capita exceeds the average Russian indicator more than 4.5 times. Nevertheless, the enterprises have not yet managed to achieve a significant scale of distribution of innovative products despite relatively high market novelty indicators. Probably, it is connected with the innovation cycle (Nizhegorodtzev et al., 2017), when the period of creation of products new for the market is followed by the period of their active distribution (Golichenko, 2020).

Like the regions of the second cluster, the regions of the third cluster also focus on interaction with foreign partners. However, unlike the previous case, cooperation does not occur at the stage of research and development but is carried out through the acquisition of finished technologies abroad. As in the regions of the second cluster, the scale of distribution of innovative products in the market is not significant. At that, the average level of market novelty of products exceeds the all-Russian one almost twice. Thus, the enterprises of the regions achieve a relatively high quality of innovative products, including acquiring technologies abroad.

Enterprises of the regions of the fourth cluster have sufficient potential to sell developed technologies abroad. The enterprises also actively buy technologies abroad and interact with foreign organizations at the research and development stage. As an example of the region, which demonstrated this behavior during the three years, we can cite the Nizhny Novgorod region. It is possible to note the high quality of the innovative process of the region (Samovoleva and Balycheva, 2018), as a result of which the region manages to achieve a significant level of distribution of innovative products new for the local market of organizations.

The behavior of enterprises in the regions of the fifth cluster differs significantly from other regions. The region is characterized by large specific scales of acquisition and sale of technologies. At the same time, most technology transfer is carried out inside the country. There is also no significant cooperation in the processes of the creation of new knowledge with foreign partners. During the three years, this type of behavior was demonstrated only by the enterprises of Moscow. For two years, this type of behavior was also followed by the Tula and Kaluga regions' enterprises.

3.2 Peculiarities of variation strategies

Several Russian regions demonstrate a change in the strategy of behavior concerning technology transfer over the period under study, i.e., transitions between clusters. The first cluster, which is neutral to technology transfer, is the most stable. Nevertheless, some regions alternate periods of technology acquisition/sales with the absence of such activity. It is possible to assume that significant growth of acquisitions of technologies from abroad leads to an increase in the quality of innovative products after a specific time (Samovoleva, 2019). Moreover, that significant growth of transfer of technologies abroad can be connected with an increase in quality of innovative products in the previous periods or with the growth of expenses on research and development, connected with innovations. In the second case, the enterprises could create technology and either not bring the product on its basis to the market, or the technology can be associated with the improvement of the production process, i.e., process innovations. To test these hypotheses, we will analyze the innovative behavior of the regions demonstrating transitions between clusters over the period under study.

To test the hypothesis that the quality of innovative products of the region has increased due to the growth of activity in the acquisition of technology abroad, we considered the regions that made the transition from the first to the second and third clusters in 2017 and analyzed the dynamics of innovation activity from 2016 to 2018. For example, the Volgograd region is characterized by an increase in the propensity to use foreign technologies and a slight increase in the market novelty of innovative products in the period under study.

To test the hypothesis of significant quality of innovative products or growth of R&D costs in regions that have changed their strategy from neutral to selling technology abroad, the regions that made the transition to the fourth cluster at any of the points in time considered were examined, and their innovation activity from 2014 to 2018 was analyzed.

Table 1: Characteristics of innovation activity of regions that have made the transition to the fourth cluster

Region	Characteristics of innovative products	2014	2015	2016	2017	2018
Russia	Scale of distribution	9%	8%	9%	7%	7%
	Market novelty	15%	14%	15%	23%	19%
Bryansk region	Scale of distribution	7%	17%	19%	7%	3%
	Market novelty	15%	5%	2%	12%	18%
Vladimir region	Scale of distribution	8%	10%	6%	8%	4%
	Market novelty	12%	31%	27%	37%	52%
Kabardino-Balkarian Republic	Scale of distribution	2%	4%	1%	1%	1%
	Market novelty	3%	32%	95%	96%	89%
Kemerovo region	Scale of distribution	2%	3%	2%	2%	1%
	Market novelty	51%	31%	42%	54%	5%
Omsk region	Scale of distribution	4%	4%	3%	3%	2%
	Market novelty	42%	45%	20%	20%	9%
Komi Republic	Scale of distribution	5%	3%	2%	0,3%	1%
	Market novelty	3%	31%	10%	54%	88%
Republic of Mordovia	Scale of distribution	27%	27%	27%	27%	24%
	Market novelty	25%	26%	9%	9%	9%

It turned out that the regions that made the transition to the fourth cluster, which is characterized by the sale of technology abroad, are focused on the production of innovative products new to the market. Simultaneously, they do not manage to establish large-scale production of innovative products new for the local market of organizations sales. This fact is evidenced by the low shares of sales of innovative products among all sales of enterprises. The exception is the Republic of Mordovia, whose share of innovative products exceeds the national average three times (see Table 1). It may also be noted that the welfare of all regions that have made the transition to the fourth cluster, except for the Komi Republic, has the level of welfare below the national average.

4. Linking technology transfer and internal research and development

This section analyzes the relationship between research and development costs and technology acquisition costs. The dynamics of this relationship are also investigated to find the overall effect (substitution or supplementation) in Russian regions.

For Russia, on average, the share of research and development costs exceeds the share of technology acquisition costs by 30%. To conduct the analysis and obtain comparable results, all expenses are reduced to one base year, and the expenses for research and development are multiplied by the coefficient characterizing the change in the volume of expenses over time. Thus, as a result, adjusted data on the volume of research and development costs are obtained, allowing us to understand the overall effect of addition or substitution.

The country is characterized by a slight predominance of the substitution effect when acquired technologies replace the need for own research and development. This situation takes place against the background of a decrease in the volume of expenses from 2015 to 2018, both for research and development and for the acquisition of technologies. Despite the slight predominance of the substitution effect on average, many regions show an increase in the relative costs of research and development, while the volume of investments in technology acquisition remains unchanged. For such regions, whose prosperity is not higher than the all-Russian one, the acquisition of technologies allows increasing their research potential. The Astrakhan and Ryazan regions can be given as examples.

5. Conclusions

As a result of the study, it was possible to identify five predominant strategies for the technology transfer of enterprises in the Russian regions. It was found that during 2016-2018 there were five stable strategies. Part of the regions turned out to be unchanged in the choice of strategy. Other regions were subject to its change. Most Russian regions proved to be inactive in acquiring and transferring technology both within and outside the country.

In some cases, the reason is limited resources, leading to the lack of opportunities to improve the quality of the innovation process through the acquired technologies, including those acquired abroad. Also, companies in other regions, having sufficient resources, may not focus on the developments of third-party organizations and create innovations without the involvement of acquired technologies. This strategy belongs to the most stable; regions are the least eager to change it. Nevertheless, there are regions that alternate periods of technology acquisition/sales with the absence of such activity. Thus, significant growth of technology acquisitions from abroad leads to an increase in the quality of innovative products after a certain period.

In contrast, the growth of technology transfer abroad may be associated with an increase in the quality of innovative products in previous periods or increased research and development costs associated with innovation. In the second case, companies could create technology and either not introduce a product based on it to the market, or the technology could be related to the improvement of the production process, i.e., process innovations. The second and third strategies aim to attract foreign knowledge through the acquisition of ready-made technologies abroad or participation in joint research and development projects with foreign organizations. The sale of technology abroad characterizes the fourth strategy despite the small overall scale of the transfer. The regions whose enterprises are committed to this strategy are characterized by significant indicators of the market novelty of innovative products, which, combined with the transfer of technology abroad, indicates a high quality of innovative products produced. Nevertheless, the enterprises fail to achieve their significant distribution in the local market. The fifth strategy is characterized by a significant scale of transfer within the country.

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Absorptive Capacity and Innovative Behaviour: Evidence From Russian Manufacturing Firms

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Abstract: The study aims to determine the connection between absorptive capacity and innovative behaviour. We analyzed firms' innovation processes and revealed the connection with their absorptive capacity at a regional level. The innovation process decomposition into sub-processes for the analysis of regional innovation processes was used in the study. For that aim, three types of innovation products were specified depending on their market and technological novelty level. Each of the types of innovation product bears the result of some innovation process implementation. For the analysis of the connection between companies' innovation process and absorptive capacity, two types of realized absorptive capacity to technological adoption from abroad will be highlighted. That adoption can take place either in disembodied or in embodied forms. The analysis uncovers that it is possible to reach large-scale innovative products with high market and technological novelty when firms intensively invest in R&D and participate in global technologies transfer, primarily in disembodied forms. The firms' ability of international technological knowledge absorption is the key factor to the innovation process. This is because most industries in these countries do not reach the level of technology of countries on the stage based on their innovations. Furthermore, the processes of innovation creation based on in-house R&D, which are performed by the firms studied, do not provide any significant contribution to the innovation process structure of the considered regions. If the regional industry's development level is relatively high but lags behind the international technological level, the scaled innovation creation processes are based on the firms' capability of the imported technologies adoption. If the companies' absorptive capacity is not large enough to transfer technological knowledge from abroad, the strategies of modifying and imitating new-to-firm products prevail in the market.

Keywords: phrases: innovation, innovation process, absorptive capacity, innovation behaviour, Russia

1. Introduction

These days the technological development of a country practically determines the competitiveness of its national economy. Along with the accelerating rates of scientific and technological progress, the technological gap between countries is increasing. As a result, advanced economies and emerging countries develop national strategies for science, technology, and innovation. As strategic priorities, the world's significant economies consider the achievement of sustainable growth, stimulation of productivity, creation of lead markets, taking the head positions in new markets, improvement of the business environment, creation of advanced technologies, enhancing of links between the participants of the innovation process (e.g. The EU Research and Innovation Programme 2021-27; The High-Tech Strategy 2025, Germany; the National Roadmap for Research, Development and Innovation, Finland). The productivity growth of these countries results from the technology gap and absorptive capacity (Dowrick, 2003). Also, these countries' companies' innovation activity bases on the processes of partnership and cooperation where the absorptive capacity plays an important role.

The strategies of catching-up and developing countries often contain not less ambitious goals. However, their overriding priority is the transition to the economy based on innovations (China The Medium- and Long-term Plan, 2012-2030; The Strategy for Innovative Development of the Russian Federation, 2035). To a large extent, these strategies are founded on catching and absorption of advanced technologies.

Therefore, research aimed at scrutinizing the absorptive capacity (Cohen and Levinthal, 1990) and firms' innovative behavior is relevant for both developed and developing countries. Many papers analyze how firms in developing countries can take advantage of technology transfer and knowledge diffusion to enhance technological development (Polterovich, Tonis, 2005; Hajek, Stejskal, 2018; Khan et al., 2019; Howell, 2020; Prokop et al., 2021).

The scientific literature covers many aspects of the relationship between absorptive capacity and innovation, including the impact of this capacity on innovative behavior (see e.g. Abreu et al., 2008; Kang and Lee, 2017; Ramayah et al., 2020). The studies emphasize the role of networks and heterogeneous sources of knowledge. For example, according to (Freund et al., 2020), an important source of foreign market and technical knowledge is weak network connections in the host country. Santoro and co-authors found a significant positive effect of firm knowledge base heterogeneity on innovation activity, but little effect of absorptive capacity (Santoro et al., 2020). Researchers often focus on R&D analysis because the positive impact of R&D on innovation has already been proven. However, "despite the extensive academic attention devoted to absorptive capacity, there are no deeper insights to date into how non-R&D firms manage the absorption of external knowledge" (Weidner, 2020). Besides, there are other types of knowledge serving as a source of innovations (Vega-Jurado et al., 2008). The purpose of our study is to find out how the absorption of significantly different types of knowledge and the innovative behavior of firms are related.

2. Literature review

Innovation activity is usually considered a consistent combination of different but connected innovation events (Landau and Rosenberg, 1986; Guan and Chen, 2011). Within this framework, innovation activity is divided into several complementary and independent stages (Bernstein and Singh, 2006). These stages are the sequence of actions from the search for knowledge resources to creating and launching new products to the market (Roper et al., 2008). In the first studies on innovation process (Utterback, 1971), innovation activity is represented as a set of primary steps, including the idea-generating, the solution to engineering problems, the innovation introduction to the market, and its diffusion. In further researches, the innovation process is considered as the linear (Clark and Fujimoto, 1991; Wheelwright and Clark, 1992; Cooper et al., 2002) or nonlinear sequence of structural phases (Cantisani, 2006; Kostas, 2006), which can overlap in time (Pavitt, 2006).

It is important to emphasize that there is no generally accepted classification of innovation stages. The allocation of innovation activity stages is typically not general and depends on the purpose of the particular study. The most widespread scheme (Hansen and Birkinshaw, 2007) is the dividing into the following three integrated stages: research and development, idea implementation, and product launch, which is accompanied by its large-scale production.

With the purpose of these complex processes implementation, companies require identifying, assimilating, and applying knowledge from the external environment. Such abilities are associated with the possibility of "absorption" of new knowledge from outside, which Cohen and Levinthal (Cohen and Levinthal, 1990) called absorptive capacity. As noted by Costa and Monteiro, based on the paper (Liao et al., 2010), "absorptive capacity mediates the relationship between knowledge sharing and innovation" (Costa and Monteiro, 2016).

Some researchers use the concept of absorptive capacity as a theoretical framework to analyze the innovation process and innovation behavior of firms (Fabrizio, 2009; Li, 2011; Costa and Monteiro, 2016; Ramayah et al., 2020). Following (Zahra and George, 2002), they often point out the difference between potential and realized absorptive capacity (Becheikh, 2013; Costa and Monteiro, 2016). The first is primarily related to the R&D efforts of companies (Cohen and Levinthal, 1990; Vega-Jurado et al., 2008; Schmidt, 2010). The number of publications, patents, and citation index scores often serve as indicators of realized absorptive capacity (George et al., 2001; Flatten et al., 2011). This type of capacity "demonstrates the ability of a firm to use consistently the integrated knowledge for commercial purposes in the long run" (Khan, et al., 2019, p.507).

Besides that, some researchers take into account the difference in the types of knowledge. Li creates a model that considers the impact of three types of investment in acquiring technological knowledge (in-house R&D, foreign technology import, and domestic technology purchase) on the firms' innovative capacity in 21 high-tech sectors (Li, 2011. Studying the behaviour of German high-tech SMEs, Freund and co-authors looked at technological and market knowledge from innovative firms, innovative suppliers, universities, and academic institutions (Freund et al., 2020). Guevara-Rocero, 2020 divided foreign knowledge according to the level of technological intensity from primary goods imports to high-tech imports.

Cassiman and Veugelers (2000) proposed a simple division of technological knowledge into embodied and disembodied forms. Embodied technology absorption implies that a firm can only absorb and use elements of the technology, and the ability to reproduce it in its entirety is quite small. In contrast, the absorption of

disembodied technology means that more knowledge is acquired and often intensive development and use of own disembodied knowledge. For example, studies (Liao et al., 2020) have shown that innovation based on the importation of disembodied technology is positively associated with industrial rationalization, while in the case of embodied technology it is depressing. Rijesh analyzed Indian manufacturing and demonstrated the positive effect of capital goods imports on engineering industries (Rijesh, 2021).

Based on these papers, we assume that different types of absorptive capacity determine the different types of firms' innovative behaviour. The critical factor of the innovation process of firms in countries at the investment stage of development is the ability of international technological knowledge absorption. This is because most industries in these countries do not reach the developed countries level of technology (see also Li, 2011).

3. Data and research method

To answer the research questions, we analyzed the innovation process of Russian companies and identified the relationship with their absorptive capacity at the regional level. The regional level was chosen for detailed analysis since regional characteristics have a significant impact on absorptive capacity and innovation activity (Abreu et al., 2008; Gokhberg and Roud, 2016). Many Russian researchers analyze innovation activity at the regional level but ignore the aspect related to the absorptive capacity of regional enterprises. This problem is considered mainly at the macro level in several papers (e.g. Polterovich and Tonis, 2005). In addition, Russian regions have a strong sectoral differentiation and are comparable to small countries in the area and population size. This allows us to operate with a sufficient amount of data. For this purpose, four regions with developed production were selected (Ayvazyan et al., 2016).

The data used in the study were provided by Russian innovation surveys dated 2009 - 2013. The firm data was collected as a random sample based on the Federal State Statistics Service database, including industrial sectors numbered 15-37 and selected service sectors numbered. The survey design is based on the Oslo Manual (OECD, 2005) and is universally accepted as compatible with the Community Innovation Survey. The database includes more than 35000 firms. The questionnaire was sent to the managers of these firms aiming to identify their innovation activities.

In the study, we use the innovation process decomposition into sub-processes to analyze regional innovation processes. For that purpose, four types of innovation products were specified depending on their level of market and technological novelty:

- 1) new-to-market and newly introduced or significantly improved innovation product;
- 2) new-to-market and only modified innovation product;
- 3) new-to-firm and newly introduced or significantly improved innovation product;
- 4) new-to-firm and only modified innovation product.

Each of the types of innovative products is the result of the implementation of one or another innovation process. The first type of product can be the result of a new product creation process or an innovation imitation process. In this case, a copy of the product is new to the local market, but already known outside it. Alternatively, the product may be produced through a combination of these processes. When R&D is a significant factor in innovation, the innovation process is likely to focus on the creation and implementation of a new product. If large-scale technology acquisition occurs, there is a high probability that an imitation innovation process has been implemented. If companies have a higher level of absorptive capacity to embrace technology in disembodied forms, absorptive capacity can be used as the basis for the process of creating new-to-market products.

Products of the second type are not considered in the study, since the cases of introduction of products new to the market and only modified products are not separated in the statistics used. It is assumed that products new to the firm and newly introduced (the third type) are the result of the process of imitation of products that are already known in local markets. It should be noted that imitation processes can be accompanied by processes of product modification and improvement using the firms' resources. Imports of embodied technologies can be used to implement these processes. The introduction of products new to the firm and previously introduced (the fourth type) means the modification of the product, which does not affect the market and technological novelty.

As characteristics of innovative products, the volume of shipped innovative products of manufacturing enterprises in Russian regions was used. Additionally, the degree of market and technological novelty was taken into account.

According to (Cassiman and Veugelers, 2000), we have considered two types of realized absorptive capacity to adopt technology from abroad. As noted above, this absorption can occur in both disembodied and embodied forms. In the first case, the total number of acquired R&D results, patents and licenses, and know-how from abroad were analyzed. As characteristics of the second type of absorptive capacity, we used the number of technologies acquired when purchasing equipment.

Further, we applied a qualitative analysis comparing the absorption of foreign knowledge and the types of innovations produced. This method allowed us to consider the difference in lags between the assimilation and use of embodied and disembodied technologies and the production of goods.

4. Innovation process of Russian regional enterprise

4.1 The Nizhni Novgorod region

The majority of innovative products is manufactured by firms working in the following industries: manufacture of coke and refined petroleum products; metallurgy; automobile manufacture. In such a case, the firms engaged in the manufacturing of coke and refined petroleum products make the most significant contribution to the regional industry's sectoral structure.

In general, the innovation activity of the Nizhni Novgorod regional enterprises is significantly high. Within the studied period, there is a steady growth in the sector of innovative products. In 2010-2011 there was a quick change of the characteristics of products quality. The essential part of firms turned from the manufacturing of known in the local market innovative products to the release of new and unknown products in the trading area. It is likely possible by the intensive acquisition of technologies in embodied and disembodied forms from abroad (see Figure 1). It is noteworthy that there is a substantial growth in expenditures on the research and development of new products, services, and production methods.

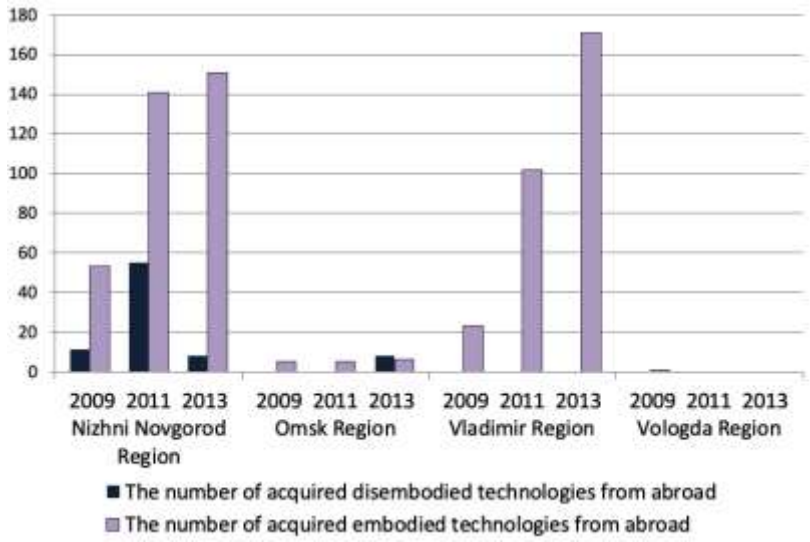

Figure 1: The international technology acquisition by the Russian enterprises

This proves that the creation of new competitive advantages in the local market through the launch of new products is primarily based on the adoption and adaptation of imported technologies. To be able to adopt these technologies, companies must increase their absorptive capacity by investing in their research. Consequently, firms are shifting from innovation activities based on minor modifications of previous products to their innovative creation and imitation of products not known in the local market but already known outside it (see Figure 2). The introduction of many new innovative products in 2010 caused imitation processes by free-riders not investing in imported technologies acquisition (Rogers, 2003). Since 2011 companies adopted innovations created by other market participants that significantly increased the scale of innovation product distribution inside the region. Participation in imitation processes required the acquisition of foreign technologies in

embodied forms from enterprises. In 2012-2013 the majority of manufactured innovative products was the result of that behavioural type following. At this stage, the adoption of technologies in embodied forms was dramatically decreased, which is possible to connect to the gain of competitive advantages of the companies capable of absorbing non-domestic technologies. They accomplished the innovation cycle for a while.

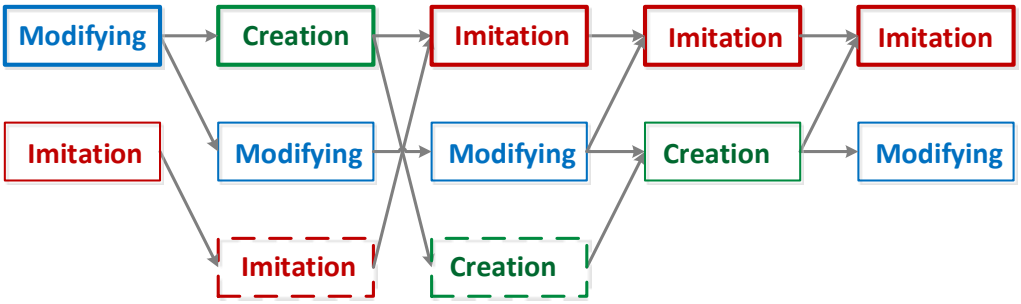

Figure 2: The structure of innovation process of Nizhni Novgorod regional companies

Despite the significant increase of Nizhny Novgorod regional companies' innovative activity and product novelty, the earlier laid groundwork (2010-2011) appeared insufficient to maintain remarkable product novelty for a more extended period. In 2013 a drop in the sales of new-to-market products was observed. Besides, there is the tendency of sales decreasing of newly introduced innovative products. However, this tendency is not strong due to the products copying by the follower enterprises.

4.2 The Omsk region

Chemical industrial companies manufacture the most significant part of the regional production. The share of these firms in the innovative products constitutes 55%. It stands to mention that the share of innovative products among all industry products is relatively high and makes 28%. In the sectoral structure of the industry, the share of the chemical industry does not exceed 5%, in any case. The remarkable contributions to innovative regional products belong to firms producing electronic components, radio, television broadcasting, and communications equipment (22%), and firms engaged in rubber and plastic products (16%). The manufacture makes the prevailing contribution to the sectoral structure of the Omsk regional industry of coke and oil products. However, the innovation activity of these companies is not intense. Such a situation is not typical for all regions where this industry is developed. On average, the share of innovative products is at the level of 10% regarding this type of production.

In the studied period (2009-2013) innovation activity can be characterized by a low level of innovation diffusion. The share of innovative products in this period did not exceed 6%. At the same time, a significant part of these products was new to the market and recently introduced. Most likely, it is connected with the accelerated introduction of innovations new for the market in separate branches against the background of low intensity of creation and imitation of innovations by enterprises of other branches. In other words, only a small part of regional firms had the necessary level of competence to introduce new products, including absorptive capacity. However, thanks to the activities of these companies, the prevailing processes of imitation of products that were already known on the local market were replaced in 2010 by the predominance of innovation creation (see Figure 3). Since 2011, the processes of modification of previous innovations have again become significant. However, firms were intensely involved in the processes of creating and imitating innovations. Those firms that moved from innovation to subsequent modification had all but exhausted their opportunities to gain competitive advantage by 2013. For this reason, some of them acquired new international technologies in a disembodied form in 2013 to make the transition to new products or new innovation cycles, to put it differently.

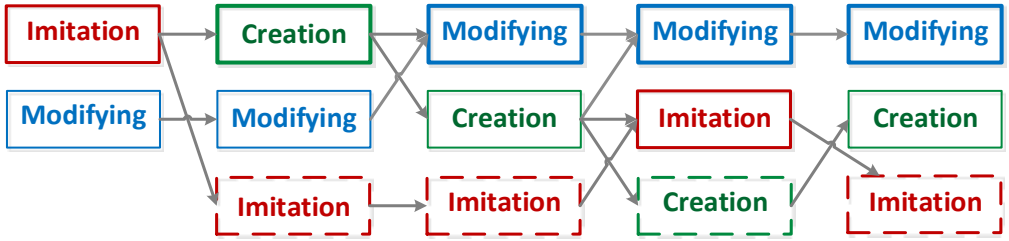

Figure 3: The structure of innovation process of Omsk regional companies

4.3 The Vladimir region

The regional innovation activity is concentrated in machinery and equipment production, although the regional sectoral structure of the industry is diverse. Companies engaged in the manufacture of machinery and equipment and firms producing medical goods provide the most outstanding contribution (on 17.9% in 2012) to the regional innovation production. In such a case, the share of the former in all regional products constitutes 10,2%, and the share of the latter is only 4%. Besides, the characteristics of product novelty are also different in these industries. The share of new-to-market innovative products is at the level of 97% for machinery and equipment production. In the instant case, the basis of innovation activity is the acquisition of embodied technologies. More than 96% of the expenditures on technological innovations are used for the purchase of machinery and equipment. The companies engaged in the production of medical goods acquire machinery and equipment for innovations (41% of total expenditures on technological innovations) and invest in in-house R&D (54% of total expenditures on technological innovations). The share of new-to-market innovative products does not exceed 12% for this industry, however.

In 2009-2010, the basis of innovation activity of regional firms was imitation and follow-up products already known in the local market (see Figure 4). Since 2010, there has been an increase in the novelty of the product market due to a significant increase in the cost of developing new products, as well as an increase in investment in the acquisition of new technologies. However, firms only acquired non-domestic technologies in embodied forms. Since the region showed the lowest innovation activity between 2003 and 2009 (Shepina, 2012), it can be assumed that firms do not have sufficient absorptive capacity to diffuse higher-level technologies.

In 2013 a slight decrease in costs on R&D and a drop in expenditures on technology acquisition was observed. The characteristics of product quality were increasing, however. The available absorptive capacity allowed companies to adopt acquired technologies from abroad and to reach more than tenfold growth of the scale of new-to-market innovation product distribution within the studied period. Unlike the Nizhni Novgorod region enterprises, the companies of the studied area were able to imply imitation purely and modifying processes. Thus, the quality of produced innovative goods is lower in this region.

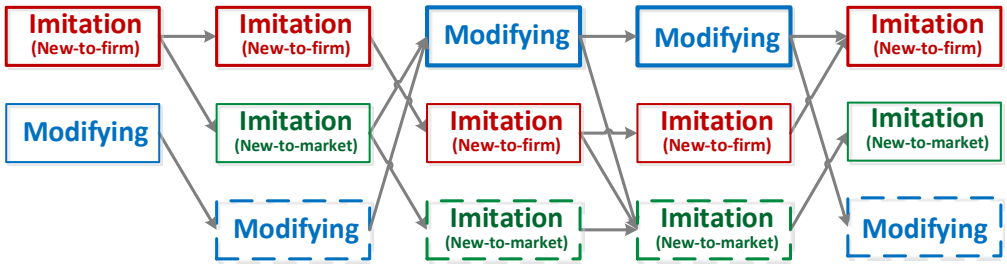

Figure 4: The structure of innovation process of Vladimir regional companies

The essential role of technological import in the innovation processes is proved true by the significant ratio of costs on imported technologies to the value of both total production and its innovative component. This fact also confirms the assumption that the growth in innovation activity is in many respects connected with innovation imitation of products that are new to the local markets but already known outside.

4.4 The Vologda Region

The innovation activity of the region concentrates on the metallurgical industry, which also makes the most significant contribution to the sectoral structure of the industry (71% and 59% correspondently). The second place in product sales belongs to chemical industrial firms (10%), the enterprises engaged in electrical power distribution and transmission (7%), and food production companies (7%) follow further.

For the metal manufacturer, the diffusion scale and characteristics of innovation products novelty are on low levels. The share of innovative products does not exceed 6%, from which 94% of products are already known to the market. Companies maintain the innovation status of the products through insignificant modification, which changes neither market nor technological products novelty. It is to note that firms do not aim to purchase technology in embodied or disembodied forms. It also stands to mention that not all Russian metals companies show the low novelty of innovative products. It is possible to consider the Volgograd, Kirov, and Chelyabinsk regions companies as examples.

In general, the quality of the innovation process in the Vologda region is relatively low. The basis of the regional innovation activity is using external knowledge. In addition, the technologies used are neither innovative nor even new for the local market. In 2009 - 2011 the processes of modification and imitation of previously introduced innovations dominated. Poor product quality prevented companies from achieving widespread adoption of innovations. During this period there was an increase in expenditures on the acquisition of Russian technologies. This allowed companies to increase the level of diffusion of innovations in the market in 2012-2013. The scale of diffusion, in any case, remained low compared to the average Russian level. The insufficient level of financial and absorption capabilities of firms did not allow them to participate either in the creation of innovations or in imitation processes when introducing foreign technologies (see Figure 5). Thus, it was not possible to significantly increase the scale of innovation diffusion and, in general, to improve the quality of the innovation process.

Figure 5: The structure of innovation process of Vologda regional companies

5. Results and limitations

The analysis shows the possibility of achieving large-scale diffusion of innovative products with high market and technological novelty when firms intensively invest in R&D and participate in global technology transfer, mostly in disembodied forms. The patterns found are generally consistent with Liao et al., 2020. Moreover, the processes of innovation creation based on internal R&D carried out by various firms do not contribute significantly to the structure of innovation processes of the regions under consideration. For example, in the Nizhny Novgorod region after 2012 innovative companies could not keep the novelty of the market and technological products without accelerated non-embodied technology transfer, despite the growth of R&D costs and embodied acquisition of foreign technologies. The latter turns out to be sufficient only for the growth of innovation diffusion. This is demonstrated by the Vladimir region. Thus, the positive effect of imports of embodied technologies (Ridgesh, 2021) on the economy of the region is not so significant. In addition, there is a danger of firms falling into the trap of imitation.

Acquisition of international technology in disembodied form means launching a new innovation cycle with a high probability. In this case, firms that have exhausted their previous competitive advantages begin to acquire such technologies to create a new product. Some imports "with more technological intensity" (Guevara-Rosero, 2020) allow to form such local advantages. In particular, the results of the analysis of the Omsk region confirm this hypothesis.

The basis of the innovative activity of the Vologda region is innovative products copied earlier from others. During the studied period the companies did not purchase foreign technologies and did not invest in their own R&D. As a result, products with the lowest level of novelty, i.e. known to the market and of low quality, appeared in their production. Large-scale distribution in this case is impossible.

The study covers several regions, and their heterogeneity is mainly due to industry differences. However, we do not consider the heterogeneity of firms (e.g., Howell, 2020) or knowledge sources (e.g., Santoro et al., 2020). It should be noted that the lack of available funding can be seen as a factor that significantly limits the growth of absorptive capacity and leads to its loss in some circumstances. Researchers also highlight determinants of absorptive capacity and innovation such as foreign investment, labor flow, and digitalization (e.g., Girma, 2005; Kang and Lee, 2017; Khan et al., 2019; Calvino et al., 2020). Therefore, future studies may elaborate on these aspects. Our results can be considered preparatory for quantitative analysis. At the same time, this study helps to identify the lag and detail the qualitative effects of embodied and unembodied technology adoption on innovation behavior.

6. Conclusions

Overall, our results confirm that if the level of regional industry development is relatively high but lags behind the international technological level, large-scale innovation creation processes are based on the ability of firms to adopt imported technologies (Li, 2011; Howell, 2020; Ramayah et al., 2020). We found that firms' new product

modification and imitation strategies prevail in the market of selected regions if the absorptive capacity of firms is not large enough to transfer technological knowledge from abroad. Moreover, the presence of absorptive capacity to adopt disembodied technologies is a motivation to start a new innovation cycle aimed at gaining a competitive advantage from the launch of a new product. Thus, the prevailing innovative behavior and the structure of the innovation process depend on the ability of firms to absorb different types of knowledge.

Regions with economic advantages can benefit most from importing technology (Guevara-Rosero, 2020). By developing and combining the firms' absorptive capacity of different knowledge types, regions also benefit more. In other words, absorptive capacity is a factor of regional inequality. The pandemic and the crisis further emphasize the need to increase absorptive capacity to reduce these inequalities and barriers to knowledge transfer.

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A Diachronic History of Public Policies on Entrepreneurship Education Programmes in Portugal (2006-2018)

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Abstract: This paper provides a comprehensive and diachronic overview of the history of the of education for entrepreneurship programmes in Portuguese schools. Following the example of other European countries, these programmes began in Portugal in 2006 as a response to recommendations issued by the European Commission. This text will provide an account of the political and social initiatives that propelled these programmes, as well as an understanding of how they have been implemented. We propose a critical, multi-level analysis of a circumstance that reaches beyond the realm of education and extends well into other, crucial aspects of public policy, such as: citizenship and entrepreneurship competences, evidence-based policymaking, and the relation between entrepreneurship and economic development. This is the first study that examines the history of the education for entrepreneurship programmes in Portugal. Using a case study approach, this paper contributes to the knowledge of the development of this education strand in the country and its presence in the regions that have had a continued exposure to them – through a systematisation and presentation of original qualitative and quantitative data (concerning the number of students, institutions and educators involved) and results. Moreover, this paper will also highlight the pedagogic strategies and methodologies used (in the face of the difficulties presented) in the implementation of these programmes, in order to make sure that the learning outcomes were aligned with best practices observed in the field of entrepreneurship education. We also add to the literature by showing how initiatives might be enhanced and strengthened through public policymaking and how they refresh the education system and introduce new challenges for all parts involved (i.e., students, parents, schools, teachers, businesses, and local entities – which, as we will see for the Portuguese case, are still far from acting in an articulated manner and under a common strategy). The conclusions include the identification of best practices and success factors (as well as the identification of blocking factors), thus meaning that this study not only provides a deeper comprehension of socio-political phenomena, but also a vision for future projects and strategies connected to this field of education.

Keywords: entrepreneurship education, citizenship education, compulsory education, public policies, decision-making process, economic development

1. Introduction

This paper focuses on the development of the public policies on entrepreneurship education[1] and its implementation in Portugal. It should be highlighted that there is a strong need to study the phenomenon of entrepreneurship (especially entrepreneurship education) in Portugal. Indeed, this has remained an acknowledged gap in the literature (Banha, 2020), which we intend to help fill – even if only in broad strokes. This enquiry initially stemmed from a suspicion that there has been discrepancy between institutional discourse and actual political action to advance EE in the country.

Since 2003, several studies by the European Commission and other European Union institutions on entrepreneurship education (EE) have emphasized its importance and discussed the benefits of including it in all levels of education, as shown in the Figure1, below:

In Portugal there is a lack of school participation in EE. For example, the penetration rate of entrepreneurship education programs in the academic year 2017/2018, despite having started in 2006, was 4% and 2.2%, regarding students and teachers, respectively. In turn, only 0.26% of the continuous training actions carried out by teachers in that school year covered EE. The following table systematizes data on the evolution of the numbers of entrepreneurship education in Portugal:

[1] For a comprehensive literature review regarding the "on/about through" framework of entrepreneurship education, as well as an overview about the concept of entrepreneurship as a pedagogical ethos see Kakouris and Liargovas, 2020.

Figure 1: European initiatives and legislation on education for entrepreneurship. Source: Banha, 2020

Table 1: Evolution of the numbers of education for entrepreneurship in Portugal. Source, Banha, 2020

SCHOOL YEAR	SCHOOLS						TEACHERS						STUDENTS							
	DGE Pilot	DGE PNEE	DGE INOVA	DGE Youth	JAP	GES	DGE Pilot	DGE PNEE	DGE INOVA	DGE Youth	JAP	GES	DGE Piloto	DGE PNEE	DGE INOVA	DGE Youth	JAP	GES	EE	NATIONAL	Studen ts EE %
2005/06	-	-	-	-	7	14	-	-	-	-	43	24	-	-	-	-	1.075	800	1.875	1.532.128	0,1
2006/07	25	-	-	-	51	30	121	-	-	-	274	62	1.702	-	-	-	14.316	1.381	17.399	1.494.946	1,2
2007/08	-	99	-	-	220	58	-	301	-	-	-	205	-	4.099	-	-	16.957	3.726	24.782	1.514.396	1,6
2008/09	-	37	-	-	-	76	-	77	-	-	150	358	-	520	-	-	25.075	6.983	32.578	1.693.182	1,9
2009/10	-	-	-	-	-	86	-	-	-	-	-	355	-	-	-	-	27.914	7.397	35.311	1.652.782	2,1
2010/11	-	-	-	-	435	231	-	-	-	-	1.258	864	-	-	-	-	26.259	8.618	34.877	1.561.620	2,2
2011/12	-	-	110	-	401	398	-	-	-	-	1.173	1.072	-	-	1.662	-	24.866	12.701	39.229	1.484.271	2,6
2012/13	-	-	139	-	422	448	-	-	-	-	1.473	1.266	-	-	3.020	-	28.147	12.535	43.702	1.408.890	3,1
2013/14	-	-	26	-	452	649	-	-	107	-	1.250	1.256	-	-	1.622	-	30.862	14.563	47.047	1.359.711	3,5
2014/15	-	-	187	-	520	277	-	-	347	-	1.300	680	-	-	912	-	32.686	13.196	46.794	1.353.550	3,5
2015/16	-	-	-	40	-	173	-	-	-	230	1.708	453	-	-	-	3.072	38.343	9.178	50.593	1.325.160	3,8
2016/17	-	-	-	38	478	180	-	-	-	299	2.038	519	-	-	-	4.604	35.210	11.264	51.078	1.322.993	3,9
2017/18	-	-	-	38	573	191	-	-	-	299	2.127	530	-	-	-	2.304	39.130	11.342	52.796	1.314.054	4.0
TOTAL													1.702	4.619	7.216	10.000	301.710	92.722			

We can see an increase in the number of students involved, with their average annual growth rate being about 20%. Despite this evolution, the percentage of students involved these programmes against the total number of students in compulsory education remains symbolic (4% in 2017-2018). For a term of comparison, in Denmark the number of students involved in EE reaches 19% in first cycle education, 50% in high school (Moberg, 2014).

A key factor for the spreading and implementation of EE programmes is the collaboration of teachers attached to public and private schools. Before they become local partners in these programmes, they must first engage in specific training. Therefore, it is also useful to take a look at the numbers concerning these actors and their intervention in EE programmes:

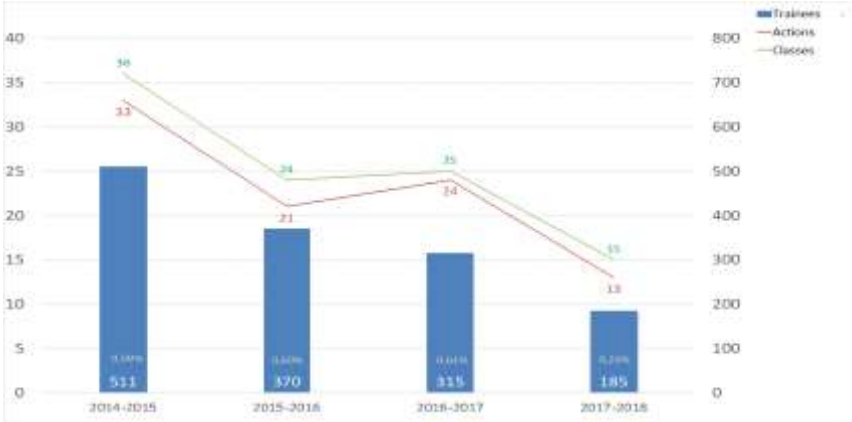

Figure 2: Annual evolution of teachers-in-training, as well as their participation in entrepreneurship actions 2014-2018. Source: Banha, 2020

Figure 2 shows a trend: there are not only fewer teacher involved in EE training, but there is also a decrease of the participation of teachers in EE-related activities.

Still concerning EE policies in Portugal and the hard numbers and evidence behind it, when we look at Figure 3, we see a great imbalance between the north and the south. There is a profound inequality in access to EE. While in the north and in the center of the country there is dynamism concerning this type of training, the other regions contrast with the almost lack of EE initiatives.

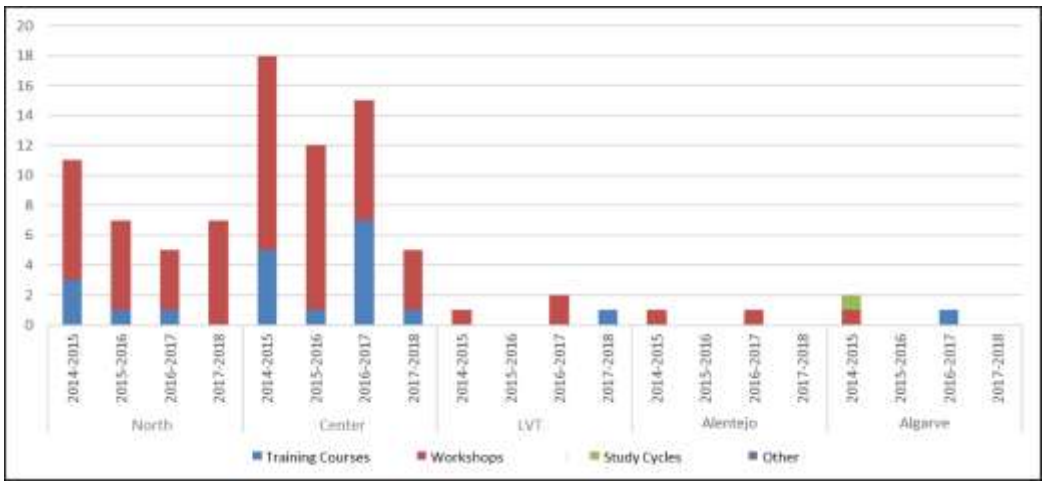

Figure 3: Annual evolution of EE initives by type and Portuguese regions (2014-2018). Source: Banha, 2020

It is against the background that these numbers provide that we will explain next the different phases concerning the introduction of the concepts of entrepreneurship and entrepreneurship education in the country. We have identified a set of policies and projects that are considered a reference to analyze the policy cycle concerning EE and are paradigmatic of the action of some national political actors and the institutions they represent. It is therefore important to present, in a systematized and chronological way, the set of initiatives that were being developed, their legislative framework and the respective actors that promoted them. Thus, the information contained in Figure 4 will serve as an "anchor" for the understanding of the various phases of the Portuguese case; it tells us how the EU has boosted EE in Portugal, since 2006.

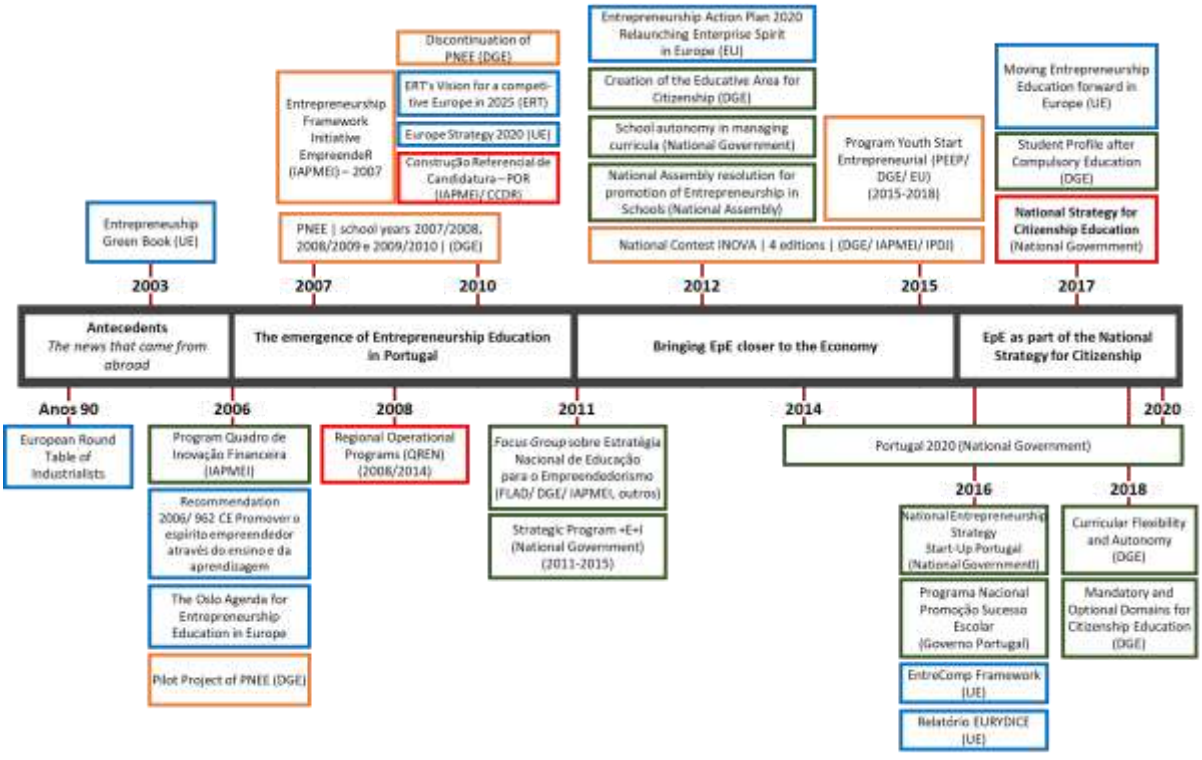

Figure 4: Chronology of the legislative and institutional framework of policies on EE. Source, Banha 2020

2. Description of the four phases

2.1 News from abroad

During the 1990s, the EU (which harbors major political, economic, educational, social and cultural differences) received a set of recommendations from the European Round Table of Industrialists (ERT) on the training and education systems of the countries that, at the time, constituted this transnational political organization. In one of tis documents, the ERT acknowledged: "Young people need better education and training. Teachers and educators are invited to request information about what are the objectives of the current society and how to work for its future. But society, in turn, is called upon to ask teachers and educators to have greater awareness and openness to a constantly changing world." (ERT, 1993). They also added: "there is a gap between basic education provided and initial training provided by state education systems and the real needs of the world of work, with particular emphasis on the skills needed for integration into the labor market and employability. (ERT, 1994)

These and other concerns were reflected at the beginning of the 21st century in the Lisbon Strategy. In Portugal the political actors and institutions have developed their orientations a great deal, namely in the qualification of professionals for a more productive and competitive employability. This was done by investing in the transmission of new skills and in lifelong education and training (European Union, 2000a).

In 2003, the European Commission published the Green Paper on Entrepreneurship. This publication is heralded as a milestone and proposes a set of initiatives to promote entrepreneurship. To a vast degree, it explains the importance of EE. At the same time[2] the European Council and the European Commission presented the "Intermediate Report of the Education and Training Programme 2010" (Council of the European Union and The European Commission, 2010), which continued to warn about the need for education systems in Europe to promote, together, the transmission of skills and attitudes that would lead to a more entrepreneurial and innovative European society. The document explicitly referred to the need to focus efforts on "Further promoting entrepreneurial spirit, which should result in the development of creativity and the spirit of initiative and be based on a transdisciplinary approach. Schools should also be empowered to carry out activities that foster attitudes and competences entrepreneurs" (Council of the European Union and the European Commission, 2004).

Thus, it was not a surprise when, in 2006, the European Union launched recommendation 2006/962/EC for Member States. It recommended that, in the context of learning essential skills throughout life, "public authorities, especially the competent authorities in the field of education, employment, industry and business, should actively promote entrepreneurship education" (OJEU, 2006). 2006 is also the year of the Olso Agenda for Entrepreneurship Education, a key-document concerning EE in Europe. In included not only a framework for policy development in all member states, but also measures of support and recommendations for the implementation stage of EE programs in different education levels.

These supranational recommendations opened a window of opportunity for national entities, with responsibilities in the area of education. Indeed, they decided to promote and launch the first national initiatives around EE. Chief among them was the design and operationalization of a Pilot Project, as we will have the opportunity to detail in the description of the following phase.

2.2 The appearance of entrepreneurship education in Portugal

In 2006, Direção Geral da Educação (DGE), the institution that puts in practice the governmental strategy concerning education, decided to implement a pilot project to support the construction of a technical solution to allow the implementation of the political guidelines provided by supranational organizations. In particular, the European Commission and the challenge posed by its Communication COM 33 (2006), that determined that EE should enter the national education system. According to this document, this was based on the need to

[2] "Given that both personal and management skills are key elements for success, personal skills relevant to entrepreneurship should be taught from an early age to university level, where management skills should be deepened. The European Commission considered that almost all Member States, with different levels, have committed themselves to promoting the teaching of the entrepreneurial spirit in their respective education systems", (CE and EC, 2010)

respond to a set of economic indicators related to factors such as "professional integration", "employability" and a more entrepreneurial "citizenship" in the context European.

The implementation of the pilot project took into account the similar experiences that had been taking place at international level as well as the need to offer support and incentives to schools in order to foster entrepreneurship activities and to support the efforts made by specialized organizations to disseminate entrepreneurial culture and encourage the establishment of partnerships with the business world.

In the process of building this concrete political solution, we found that there was an opening of the Direção Geral de Inovação e de Desenvolvimento Curricular (DGIDC), the branch DGE that supervises syllabi, to civil society. To do this, DGIDC relied on an accredited company with "Know-How" in the areas of entrepreneurship, to develop a script that served as the basis for entrepreneurship activities that were subsequently launched with a set of schools, teachers and students. All of these elements ensured the technical feasibility of the pilot project[3].

25 schools were selected to implement the project. This was done in collaboration with the Regional Directorates of Education and task forces originating in civil society that actively participated in all phases of implementation of the project. The goals set intended to contribute to the standardization of the lines of action and their progressive generalization in the short term. An interventive methodology was adopted and its procedures were co-oriented and open to feedback by students. The contents and themes of the syllabus were adapted to the reality of the educational community. The design and implementation of entrepreneurial activities followed a process imbued with entrepreneurial practice, i.e., a process that took into account goal setting, planning and organization, execution and evaluation.

According to these procedures, it was possible to carry out three major lines of action: (i) design of the syllabus, creation of favorable conditions, and training of agents; (ii) development of the pilot project in each school, involving a monitoring and support committee for groups of students and (iii) evaluation of the pilot project in each school, along with the participation of all stakeholders.

In turn, the institutional partnerships were assigned specific functions. Namely: (i) Central Business – training of agents involved in the pilot project, study of methodologies and evaluation, advice to supervision and consulting in the final evaluation of the project; (ii) Business Innovation Center - Providing support to the planning and development of the project in each school; (iii) Confederação Nacional de Associações de Pais (CONFAP) – Dissemination and awareness of the associations of parents of the schools selected for the implementation of entrepreneurship in schools, so that parents participate actively and consciously in the project; (iv) Regional Directorates of Education (DGRE) – they worked closely with the DGIDC in the design, organization, dissemination and monitoring of activities. These entities came to be part of an evaluation committee, at regional and national level, which was responsible for monitoring and evaluating the pilot project. It should also be noted that, within the scope of this project, two didactic-pedagogical instruments were created to support its implementation: The already-mentioned Script for the Promotion of Entrepreneurship in School, and the virtual community of the pilot project.

This script emerged as a provisional version in the course of the pilot project. Benefiting from the incorporation of contributions, criticisms and suggestions of professionals who worked in the school context, it was conceived to serve as background to the development of key competencies of entrepreneurship in school and the way this concept can be promoted in the school environment, with palpable results, measurable both qualitatively and quantitatively. Therefore, all curricular and disciplinary areas should act in a convergent way, and it was up to the schools and their teachers to operationalize these competencies in a transversal way.

We also saw a direct integration of various political actors and educational communities in the implementation phase of the pilot project, transforming the abstract policy of the decision context into an action carried out by society and its organizations (Central Business (CB), Business Innovation Centre (BIC), CONFAP, among others) in an environment of cooperation, trust and delegation of competences.

[3]See Dossier PNEE National Project "Education for Entrepreneurship", December 2007 (Available in: https://www.dge.mec.pt/sites/default/files/ficheiros/dossier_pnee_piloto.pdf).

The technical preparation of the people and the teams responsible for implementing the pilot project was also a facilitator of a successful implementation of the pilot project in the 25 schools – which comprised both basic and secondary education. The results obtained with this pilot project allowed the consolidation of methodologies, processes and resources, and provided guideline for (a possible) implementation of the Project at a national level. This process also contributed to the discussion of EE in Portugal[4], both by the society and governmental decision-makers. In addition, it was possible to watch, first-hand, training activities with education technicians, and the coordination between the executive councils of schools and their regional directorates of education. As for the technical support, it was carried out by and specialized companies that, in partnership with DGIDC, provided information concerning working methods in order to mobilize entrepreneurial projects in schools (PNEE, 2007).

In the 2007-2008 school year, the PNEE - Projeto Nacional de Educação de Empreendedorismo (National Entrepreneurial Education Project) was launched (which was carried out during the following two school years). It was based on the methodologies and the contents that were tested during the above-mentioned pilot program. For the first time, elementary schools and professional schools were also considered to be part of the. Some of the action strategies were reconsidered and pedagogical support devices were updated. This was done bearing in mind the importance of promoting and establishing EE among the schools that came to integrate this project (PNEE, 2007). The set of procedures that were adopted in the design and implementation of the operations (supervised by the DGIBC) of these projects were underpinned by: (i) key processes in EE services; (ii) management processes (which led the organization of the programs and supported the key processes) and (iii) support processes, which provided the necessary resources.

In the 2008-2009 academic year, the DGIDC decided to continue the Project, based on the work developed in the previous year by the schools that were part of the PNEE. The DGIDC adopted a strategy aimed at consolidating the good results achieved, maintaining the purposes and methodology, as well as the support and monitoring that had been ensured to the participating schools. This resulted in an increase in the number of students/classes/projects/groups (as well as greater involvement of parents and other partners).

With regard to the financial aspect that supported the implementation of the PNEE, we came to the conclusion that this Project was in great part supported by private sponsors – such as Portugal's largest bank, Caixa Geral de Depósitos, the Calouste Gulbenkian Foundation, and the Luso-American Foundation for Development. The results of this fundraising covered expenses related to PNEE's innovative initiatives.

In the third year of the PNEE, just when its expansion seemed to be the only way, its maintenance was considered too expensive by DGIBC - especially with regard to the costs of the implementation model and the training of teachers[5]. It should be noted that this happened in the context of severe financial constraints, arising from the political and economic situation of the country.

In addition to these financial factors, the indicators of achievement and impact were added. They demonstrated the lack of scalability and sustainability of the Project, which, in a situation marked by the economic crisis and the assistance of the TROIKA, proved to be an inhibiting condition for the continuity of the PNEE[6]. The Program was discontinued in 2010 by DGIDC. The role of leadership was thus decisive, both in starting the Pilot Project and the PNEE, and in discontinuing it. This role is all the more important when we observe that the decision of discontinuing it went against the recommendation of the PNEE evaluation report, made by external entities.

In parallel to these two initiatives carried out by DGE, IAPMEI also made efforts to create favorable conditions to boost entrepreneurship and competitiveness (goals enshrined in the Financial Innovation Framework Program of 2006) (Banha, 2020). IAPMEI launched an action plan for entrepreneurship that covered the whole value chain of entrepreneurship (Framework Entrepreneurship Initiative €MPREENDE®) underpinned by a network of partnerships.

[4]See "National Entrepreneurship Education Report", Synthesis Report, 2006-2009 (Available at: https://www.dge.mec.pt/sites/default/files/ficheiros/relat_sintese_pnee_2006_2009web.pdf)

[5]According to the calculations made at the time by the director of curricular innovation of DGIDC the costs to train teachers in all schools in the country would be between 500 and 700 thousand euros (Banha, 2020).

[6]Due to the small number of participants in the initiatives promoted by the PNEE member schools, as well as the difficulties raised by the operational model adopted in terms of the number of training hours required, (Banha, 2020).

€MPREENDE® was launched by the end of 2007, after facing several difficulties due to the complexity of the model initially adopted, has proved decisive in the approach of EE to the economy as we will see next.

2.3 The approach of entrepreneurship education to Portuguese economy

One of the financing instruments for emerging business initiatives, created under the aforementioned Financial Innovation Framework, in which many expectations were placed, was the FINICIA Program. However, this instrument, presented scant results from isolated initiatives and an overlap of initiatives on the ground (with oversupply in certain areas and market failures in others). This situation eventually contributed to IAPMEI's interventions in areas of business financing and technical assistance to local-based partners. This benefited already-established synergies, taking them to a new level, and thus propelled the evolution of a funding and support model favorable to entrepreneurial activities.

Based on small, local business networks and a methodology of interaction adapted to the reality of the various regional actors, the €MPREENDE initiative® (meanwhile, called "Entrepreneurial Portugal" because it has become a local-based entrepreneurship project), has achieved, in the Convergence Regions, the support of the majority of municipalities through Inter-municipal Communities (CIMs) with the development of local-based entrepreneurship projects – co-financed within the QREN Community Support Framework. It was in this moment that IAPMEI managed to raise awareness among those responsible for some Comissões de Coordenação e Desenvolvimento Regional (CCDR) and some CIMs (in addition to other regional, municipal and local entities) on the importance of allocating funds to EE activities in schools (as it happened in an exemplar way, in the Intermunicipal Community of Viseu Dão Lafões) (Banha e Saúde, 2020).

This dynamic, triggered by the IAPMEI, was very important for the advancement of EE (in several regions of the Portugal), both in terms of the design of a reference for "Immaterial operations to promote entrepreneurship" (which allowed some CIMs to have access to funds to adopt an operational model based on educational solutions tested and recognized by DGE), and the demonstration effect, provided by the implementation of these programs, with local authorities. It should be noted that the experience lived by the head of IAPMEI in this area of education proved to be decisive. He was later involved with DGE and IPDJ in the design and implementation of a national ideas contest "INOVA! Young Creatives, Entrepreneurs for the 21st Century 2011/12", with the aim of stimulating entrepreneurship and entrepreneurial culture among children and youths. This contest had its legal premises based in the National Strategy of Entrepreneurship and Innovation - Program +E +I , launched by the new government.

Indeed, the XIX Portuguese government (2011-2015) (a coalition between the social democrats of PSD and the conservatives of CDS-PP), opened a window of opportunity that the IAPMEI used to put the EE in the decision agenda. It should be noted that in the decision-making process regarding INOVA (this educational policy was included in the +E+I Program), there was consensus among policy makers on the need to implement EE nationwide. This consensus was important for the continuous implementation of this Competition, that had 4 editions.

In this scenario, DGE takes a new approach when it came to EE. Instead of participating in the design and implementation of the respective programs, it became a facilitator and aggregator (in close connection with other state entities) of the various initiatives that schools and other partners annually carried out, as part of their educational activities on EE. At the same time, the IAPMEI's structure is reconfigured and the support to entrepreneurship in compulsory education through this institute is discontinued.

With the entry into office of the XXI Constitutional Government, the +E + I Program ends. Consequently, the Inova Competition (which had its 4th Edition in the 2014-2015 school year) also reaches its end. This marked a new this moment for EE in Portugal, especially with regard to the strategy followed by the new government. In fact, although the XXI Constitutional Government also launched, in 2016, its National Entrepreneurship Strategy – also known as Startup Portugal – with the aim of developing the Portuguese entrepreneurial ecosystem, this strategy did not include initiatives in the area of EE, as it can be seen in its document of reference: "Startup Portugal is the strategy of the Government of the Republic for Entrepreneurship designed for four years, focusing on 3 areas of activity: I. Ecosystem; II. Funding and III. Internationalization. More than fostering entrepreneurship, this program is designed to support those who are already entrepreneurs, to ensure the

longevity of the businesses created and to ensure that they have a greater impact in terms of job creation and economic value (Startup Portugal, 2016)."

Concerning education, the new government creates the National Program for the Promotion of School Success[7], with which it intended to "Promote quality education for all, combat school failure, in a framework of valuing equal opportunities and increasing the efficiency and quality of public schools". In this context, this Program, is paramount since its implementation is intended to be articulated with local educational communities, in particular schools, municipalities and inter-municipal communities. At the same time, the government decides to appoint a Citizenship Education Work Group (GTEC)[8], with the mission of designing a Citizenship Education Strategy to be implemented in schools. It will be in the context of the Citizenship Education Areas that EE will reappear in the agenda.

2.4 Entrepreneurship education included in the context of the national strategy for citizenship (ENEC)[9]

Considering that Citizenship Education is a mission of the entire school system, the aforementioned Work Group proposed, within the scope of ENEC, that the curricular component of Citizenship and Development should be the privileged curricular unit for a learning with threefold impact: in the individual civic attitude; in interpersonal relationships and in social and intercultural relationships. Thus, the curricular unit Citizenship and Development is part of the syllabus of elementary and high school education, as per the Law-Decree 55/2018. It is developed according to three complementary approaches: transdisciplinary nature at elementary school level; autonomous curricular unit in basic education; and crucial component, developed across the board, in high school.

Indeed, Citizenship Education is addresses different areas and skills that the individual should develop. These areas are organized in 3 groups: Group 1- Mandatory for all educational levels; Group 2 - Required in at least 2 educational level, and Group 3 - Optional in any year or level. In the view of this organization, the development of the principles, values and entrepreneurial skills of students are included in the 3rd group. In other words, the development of entrepreneurial skills they are optional. It is up to each school to decide their relevance and framework. EE is, therefore, on the same level as other areas such as, security, defense and peace, and animal welfare.

This option is all the more ambiguous as the position taken by the Directorate-General for Education on the theme of entrepreneurship, entrepreneurial spirit and EE is present. As stated (Banha, 2020): "Entrepreneurship is a new look at the world, based on knowledge and innovation, from the involvement of people and processes that, together, promote the construction of ideas, the evaluation of opportunities, the mobilization of resources, the assumption of risks and the implementation of differentiated and successful initiatives. It is essential that the school provides at all levels of teaching a culture favorable to the acquisition of knowledge and the development of attitudes, skills and values that promote the entrepreneurial spirit. Namely: creativity, innovation, organization, planning, responsibility, leadership, group work, vision of the future, risk-taking, resilience and scientific curiosity, among others. Entrepreneurship education is a transversal contribution to the different disciplines and non-disciplinary areas that are embodied in activities or projects, developed in a way that is participated by students, contributing to change in their area of activity as citizens."

3. Conclusion

This situation is difficult to understand because we have the notion of all the enthusiasm generated by entrepreneurship in previous years, enshrined in dozens of documents from the European Commission, the OECD, the UN, the last three national governments, the DGE and even the Assembly of the Republic itself. We have no reason to believe that the belief in EE, widely supported by documents from institutions that now reach the point of purging this term, has faded. It is indeed difficult to explain this situation of finding entrepreneurship implicit in the doctrine and spirit of the text, and not explicit in the letter of the law or official options in terms

[7]21 See: Resolution of the Council of Ministers No. 23/2016 (Diário da República, 1st series No. 70 - 11 April 2016).
[8]Joint Order (Order No. 6173/2016, published in The D.R., II º Série, no. 90, of May 10, 2016) of the Secretary of State for Citizenship and Equality and the Secretary of State for Education.
[9]The National Strategy for Citizenship Education (ENEC) integrates a set of rights and duties that must be present in the citizen education of Portuguese children and young people, so that in the future they are adults with a civic conduct that privileges equality in interpersonal relationships, the integration of difference, respect for human rights and the valorization of concepts and values of democratic citizenship, within the framework of the education system

of the areas of curricular[10] autonomy. What we have seen in the Portuguese case corroborates the findings by Kakouris, Dermatis and Liargovas (2016) and the intrinsic difficulties and contradictions in the processes of advancing a "knowledge-driven" economy and EE. As we have seen at the beginning of this paper, only a very residual number of students and teachers have had access or have been involved in EE in Portugal. We have provided an account of the untold story of EE in Portugal; how it began as a pilot project that was quickly discontinued due to the financial crisis and reappeared, in different shapes and forms, throughout the years. Its absence speaks louder than its presence, despite the continuous release of official documents advocating the relevance of entrepreneurship. Today we stand at a turning point with the covid-19 pandemic. Even if it is difficult to predict what future might have in store for EE in Portugal, we can, at least, look at its past and shed some light on it.

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[10]It should be noted that the word "entrepreneur" (and not entrepreneurship) appears only once in the document Profile of Students at The Departure from Compulsory Education, 2017. It appears only in the context of the "values" section, regarding citizenship and participation, recommending that the student be able to "be interventional, take the initiative and be an entrepreneur"

Value-Based Framework Development for Consumer Internet of Things (CIoTs): A Design Thinking Approach

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Abstract: The use of Consumer Internet of Things (CIoTs) is increasing due to their ability to deliver services anytime, anywhere and through any medium. To get the most out of CIoTs, a comprehensive design that incorporates consumer desires and preference are essential. For this purpose, establishing effective frameworks and models that can be taken as input in CIoTs development and design are important. However, lack of such frameworks has been affecting the consumption experiences of users. The objective of this paper is to develop a value-based framework that can be used for comprehensive design of CIoTs. To develop the framework, we systematically reviewed and analyzed 72 published peer reviewed articles. As an approach, we used Design Thinking (DT) methodology specifically, the double diamond model to develop the framework. Accordingly, in the value creation processes, desired consumer value is taken as design input, then a product possesses value through design based on desires, and create the actual value during interaction (user experience). In the proposed framework, desired value dimensions (functional, emotional and social) have been broken down in to their respective measurable units. Quality/performance, value for money and easy-to-use are elements in functional value whereas hedonic, control and novelty are dimensions of emotional value. Image/status, trust and networking are considered as dimensions of social value. Then, seven basic CIoTs features are identified and the impact on user have been analyzed. These include connectivity, interactivity, intelligence, observability, compatibility, adaptability and safety. In the process, we can observe that one or more CIoTs features can be affected by similar desired values. This framework integrates consumer desires (from functional, emotional and social value perspective), CIoTs features (desire-driven) and user experience (actual interaction). CIoTs features are derived from user desires and are enablers for better user experiences. Developing such value-based frameworks will help designers and producers to incorporate consumer needs in the early stages of development and design.

Keywords: consumer IoT, CIoTs features, user experience, consumer value, value-based framework, design thinking

1. Introduction

Consumers are increasingly faced with smart-connected devices in their daily lives (Lee & Shin, 2018). These classes of products, which are connected to each other through the Internet, are called Consumer Internet of Things (CIoTs). Their ability to sense the external environment, collect sensitive information about the user and share it through the internet (Angelini et al., 2018) can remarkably change people's lives, their workplace productivity, and consumption patterns (Shin, 2017). To maximize such benefits, comprehensive designs based on consumer preference are important. However, frameworks and models developed in the context of CIoTs to uncover consumer value are limited and the available frameworks are diverse in nature. Lack of effective value-based frameworks is one of the reasons for the failure of some of CIoTs in a market. Google glass and Juicero failures are just two important examples of CIoTs to show the necessity of comprehensive user-centered frameworks. Google glass's failure was described as 'the story of a visionary product utterly failing to be cool' (Umair Haque, 2015). Google took for granted that people should have nothing to hide from an intrusive technology (David Streitfeld, 2013) but the reality was different. Also, Juicero, a smart juice-making machine, was unsuccessful. Claire Reilly (2018) described Juicero as one of the greatest examples of Silicon Valley stupidity in which consumers were duped into spending too much money on something they didn't need (Alessa Bereznak, 2017). The problem for these two projects lies in ignoring consumer values and give high emphasis to technological advancements. User-centered value-based frameworks which will help designs and NPDs to produce CIoTs with better user experience are vital.

The purpose of this paper is therefore to develop a value-based framework that can be taken as a reference by designers in the development and design phases of new CIoTs. Functional, emotional, and social value dimensions of consumers in a multi-dimensional context were analyzed. Prominent attributes (features) of CIoTs were explored, and the relationships they have with user experience in the value creation process were

investigated. Basically, four groups of frameworks in consumer IoTs can be observed in the literature. These are Theory of Consumption Value-based frameworks, Design-based frameworks, Technology Acceptance Model, and Theory of Planned Behavior-based frameworks. This value-based framework is different from such frameworks in integrating theory of consumption value with design principles. And also focusing on value creation in the design process while other available frameworks mainly focus on the purchasing process. This paper is also unique in analyzing the value creation process using a Design Thinking approach. The methodology and approach used, as well as the theoretical foundation and development of the framework, are discussed in the following sections of this paper.

2. Related works

2.1 Consumer value dimensions

Consumer value is defined as an interactive relativistic preference experience (Holbrook, 1999). It is derived from consumption experiences, not from the commodity bought, not from the brand selected, and not from the item owned (Holbrook, 1999; Woodruff, 1997). Sheth (1991) argued that consumer choice is a function of multiple consumption values; functional, emotional, social, epistemic, and conditional values. Table 1 summarizes the most popular consumer value classifications.

Table 1: Consumer value dimensions

Consumer Value classification	Source
Social value, emotional, functional, epistemic, conditional	Seth et.al, (1991)
Efficiency, excellence, status, esteem, play, aesthetics, ethics, spirituality	(Holbrook, 1999)
Functional value (price), functional value (performance/quality), functional value (versatility), social value (acceptance), emotional value	Sweeny et.al (1999)
Functional dimension (economic and quality), social dimension, emotional dimension	Sweeney & Soutar (2001)
Functional values (installation, professionalism, quality, price), emotional value, social value	Snaches et.al (2006)
Functional values (service quality, professionalism, price, installation), emotional values (control, novelty), social value	(Kirbir, 2007)
Perceived usefulness, perceived easy to use	J. Zhang & Mao (2008)
Functional experience, emotional experience	Chang et al. (2014)
Functional, pleasure in use and social values	Mishra et al. (2014)
Hedonic value, utility value	D.-H. Shin (2017)
Usefulness, Easy to use, Emotion, Aesthetic, Fashionable, Trust, Networking	Touzani et al. (2018)
Functional experience, emotional experience	Meng et al. (2019)

Functional, emotional, and social values are highly used dimensions in consumer value classifications. Sweeny (1999) divided functional value into three dimensions: price, performance/quality, and versatility; however, in their subsequent study (Sweeney & Soutar, 2001), they used two dimensions: quality/performance and price. Kirbir (2007) further classify functional value in four measurable elements: service quality, professionalism, functional value (price), and installation. Mishra et al. (2014) also argued that functional value is aggregated by usability which extends to 'easy-to-use'. Because of the emergence of IoT, the emotional meaning is now commonly used in the literature, such as in extended TAM models as perceived enjoyment. Mashal & Shuhaiber (2019) and Gao (2014) defined perceived enjoyment as 'the extent to which the activity of using smart products is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated'. Design aesthetics and fashionable are other important emotional value elements for smart products in making purchase decisions (Y. Wang et al., 2018). Kirbir (2007) proposed three emotional value isolated dimensions: control, novelty, and hedonic. Like functional and emotional value, social value is also an important consumer value dimension. It occurs when one's own consumption behavior serves as a means to shaping the responses of others (Holbrook, 1999). Kirbir (2007) described social value as the acceptability or utility at the level of the individual's relationships with his social environment. It is also related to the image obtained from society (Benamar, et.al, 2020), the degree that users are influenced by others using the same product (Jin et al., 2013), and consumers' perception of to what extent a product enhances their social self-concept (F. Zhang et al., 2020).

2.2 CIoTs features

In CIoTs studies, three terms are used to describe CIoTs features: features (Coskun et al., 2018; McDermott et al., 2019; Meng et al., 2019), attributes (Pinochet et al., 2018; Shin, 2019; Touzani et al., 2018), and

characteristics (Meng et al., 2019; Shin, 2019; C. H. Wang & Chen, 2018). For this paper, we used 'CIoTs features' and defined it as the prominent attributes used to describe the characteristics or properties of CIoTs that will drive consumer experience (D.T.Cadden and Sandra L.Lueder, 2012). CIoTs features can be taken as value possessed by products through design and need to be arranged and structured properly (Mishra et al., 2015). Highly used CIoTs features are summarized in Table 2.

Table 2: Major CIoTs features

CIoTs Features	Sources	Contexts
Connectivity, interactivity, sense of presence, intelligence, convenience, and security	Pinochet et al. (2017)	Smartphone
Ability to be controlled remotely, Ability to cooperate, Ability to learn, Adaptability, Autonomy, Ability to provide guidance, Having human-like interaction, Multi-functionality and Upgradability	Coskun et al. (2018)	Smart household appliances
Relative advantage, compatibility, complexity, trialability, observability	Shin (2019)	IoT products
Scalability Availability, Reliability and Easy to use	Esmaeilpour G.et al. (2019)	IoT services
Perceived ease of use, perceived ubiquity, and time saving	Touzani et al. (2018)	
Security, privacy, compatibility, ease of setup, ease of use, cost	McDermott et al. (2019)	IoT devices
Visibility, compatibility, complexity, usefulness, novelty, trialability	Wang & Chen (2018)	Smart TV
Degree of association, interactivity, feeling of presence, intelligence, convenience, safety	Meng et al. (2019)	IoT products
Automation, mobility, interoperability, security/perceived risk, physical risk, trust	Yang et al. (2017)	
Display size, standalone communication, and shape	Jung et al. (2016)	Smart watch
IoT Connectivity, Interactivity, Telepresence, Intelligence, Convenience, Security	Chang et al. (2014)	Smartphone
Affective Quality, Relative Advantage, Mobility, Availability	Kim & Shin (2015)	Smart watch

2.3 User experience

Achieving a better understanding of the customers' needs and behaviors is an important step toward a successful transformation of customer experience (Kaczorowska, 2019). Pucillo & Cascini (2014) defined user experience (UX) as 'a consequence of the presentation, functionality, system performance, interactive behavior, and assistive capabilities of an interactive system' while others define consumption experience as 'consumer perception-based feelings and utilities arising out of product use without accounting for brand judgments' (Mishra et al., 2015; Yang et al., 2019). Shin (2017) used satisfaction, coolness, and affordance to measure the quality of experience of CIoTs. Pucillo & Cascini (2014) in their framework of user experience in interaction based on affordances, showed importance of affordance in designing products. Shao et al. (2020) also showed that affordance is positively associated with user satisfaction. According to Sundar et al. (2014), something that is cool is perceived as high quality and may accomplish a user's goals in a more creative manner. Table 3 summarizes some dimensions used to measure user experiences.

Table 3: Dimensions of user experience

UX dimensions	Generic terms	Sources
Uniqueness, attractiveness, sub-culture, genuineness	Coolness	Sunder (2014)
Attractiveness, efficiency, dependability, perspicuity, stimulation, novelty	User experience questionnaire	C. Alberola et al. (2018)
Appeal, pleasure, satisfaction	Pragmatic and hedonic attributes	Kasper Hornbæk and Morten Hertzum (2017)
Experience affordance, use affordance, manipulation affordance	Affordance	Francesco Pucillo et al. (2013)
Pragmatic quality, hedonic quality, beauty, goodness	UX variables	Effie L.-C. Law and Paul van Schaik (2010)

UX dimensions	Generic terms	Sources
Affect/emotion, enjoyment/fun, aesthetics/appeal, hedonic quality, engagement/flow, motivation, enchantment, frustration, pragmatic quality	UX dimensions	Ahmet Bakikocaball et.al, (2019).

3. Methodology

We conducted a systematic literature review using the query '((IoT OR "internet of thing*" OR smart) AND (product* OR device* OR good*) AND (user* OR consumer*) AND (value OR UX OR "use case" OR experience)) in Scopus and Web of Science core collections. We found 3608 total search results and made a step-by-step screening. First, we limited our search using 'articles only' of categories in 'Business and Management, Psychology, Social Science, and Ergonomics'. Then removed duplication, which resulted in 627 articles. We did further screening through abstract reading with some exclusion criteria which resulted in 142 articles. Finally, we made full paper readings and came up with 64 research articles. With snowballing, we found 8 additional articles and totally analyzed 72 research articles. We explored consumer desired value dimensions, CIoTs features, and user experience. As an approach, we employed the Design Thinking methodology developed by IDEO, a global design company. Particularly, to identify how the basic constructs are inter-related, Design Thinking was applied. Among the four models developed by IDEO, our framework mainly made its base on a double diamond (4D) model of Design Thinking (DT) because it is suitable for designing products.

4. Framework development using design thinking approach

Design Thinking (DT) puts much more emphasis on uncovering implicit and latent user needs through qualitative analysis and empathic observations (Meinel et al., 2020). DT is a user experience-driven approach described by empathy-driven user research, based on qualitative and subjective data (Meinel et al., 2020). Among IDEO models, Double Diamond (4D) is a more complete one as it was produced for designers' use (Tschimmel, K, 2012). According to IDEO, in the discovery phase, the designer is searching for new opportunities, new markets, new information, new trends, and new insights that will be reviewed, selected, and discarded in the define phase. In the develop phase, design-led solutions are developed, iterated and tested within the company under the use of DT tools such as brainstorming, sketches, scenarios, renderings or prototypes. In the fourth stage or Deliver phase, the final concept is taken through final testing, signed-off, produced, and launched. The first diamond in the 4D model is the understanding space where we have to explore consumer desired values from users and organize them in a meaningful manner (Discover-Define). The second diamond of the 4D model is the design space where brainstorming, discussions, scenarios, thematic and content analysis will be performed in order to meet design objectives. In this context, the design objectives represent features of CIoTs which are driving factors for a better user experience. In the delivery phase of the 4D model, testing and collecting data for further improved design is performed. But the journey for comprehensive product design should extend to incorporate user experiences after launching and the process has to be iterative. Figure 1 shows how 4D model will be used to map the main structure of the framework.

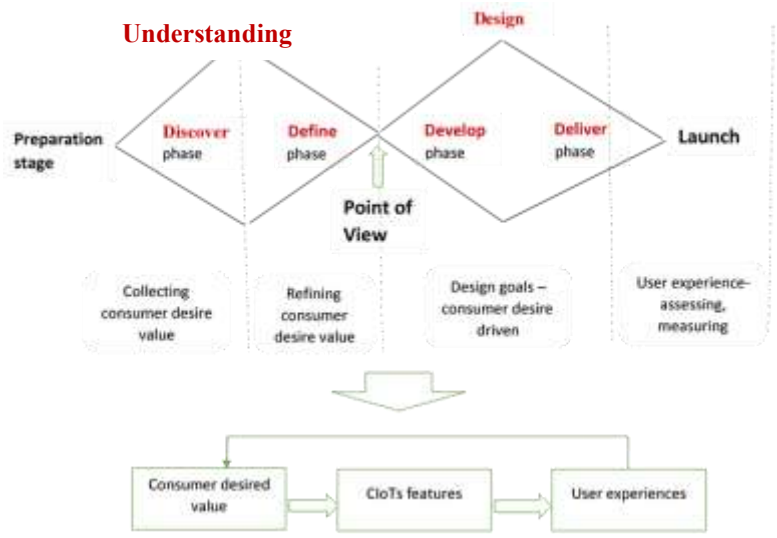

Figure 1: Double Diamond model and the customization process

From the diagram, we can understand that consumer desired value, CIoTs features, and user experience are the three pillars of our framework and the link between these constructs will provide user-centered value creation for CIoTs. This research takes DT and the theory of consumption value as input to develop the framework.

4.1 The understanding space (consumer desires)

In the understanding space, design teams collect consumer desires using data collection tools (explore consumer desires) and analyze the data in a meaningful manner (define consumer desire). In this process, basic consumer desires are identified and understood. According to our analysis, these consumer desires have been converged to functional, emotional, and social value dimensions. These three dimensions have been broken down into their respective measurable elements.

4.1.1 Functional value dimensions

Functional value is described as one of the key drivers for fulfilling consumers' needs and desires, and it is the main reason why a product is created (S. N. Bayaah Ahmad et.al, 2019). Based on previous studies, we considered three measurable elements of functional value; quality/performance, price, and easy to use.

***Quality/performance**:* F. Zhang et al.(2020) define functional value for performance as evaluations of the quality and expected performance of a product while Sweeney & Soutar (2001) described it as the utility derived from the perceived quality and expected performance of the product functional value for performance.

***Price**:* according to F. Zhang et al. (2020), functional value (price) is the utility derived from the comparison of benefits and costs. It can also describe as the utility derived from the product due to the reduction of its perceived costs (Sweeney & Soutar, 2001). Holbrook (1999) and woodruff (1997) articulated the existence of a tradeoff between perceived benefits and perceived costs in consumer value.

***Easy to use**:* refers to "the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). It can also be expressed as users perceived exerted efforts when using the IoT technologies/services (Gao, 2014). When a particular technology or service is perceived to be easy to operate, users tend to believe that the technology is useful and form a favorable attitude toward it (D.-H. Shin, 2015).

4.1.2 Emotional value dimension

Based on (Kirbir, 2007), three isolated measurable units of emotional dimensions: hedonic, control, and novelty have been considered.

***Hedonic**:* consumers typically desire a feeling of pleasure from a product or service experience (Kirbir, 2007) which can be expressed like 'fun, amusement, fantasy, arousal, sensory stimulation, and enjoyment'. Hedonic (entertainment, pleasure, aesthetics) value addresses customers' behavior and preference for using new technologies (Caputo et al., 2018).

***Control**:* control can be behavioral, cognitive, or decisional. Decisional control is thus highly linked to freedom, a fundamental component of experiential services (Kirbir, 2007). Among the three forms of emotional value (control), decisional control can be taken as an important factor in making decisions to use CIoTs. The issue of autonomy, privacy, and security might be related to emotional value (control) as such technologies become more intelligent.

***Novelty**:* it refers to change from routine, escape, thrill, adventure, surprise, and boredom alleviation. If novelty is desired by experiential consumers, then more novel experiences should result in higher perceptions of value (Kirbir, 2007) which will make users to be satisfied and experience the coolness of products.

4.1.3 Social value dimension

By mapping the concepts, constructs used to measure social value and based on the definitions of social value, three dimensions are identified potentially related to the social impact of purchase (Kirbir, 2007).

Image/status: Image refers to "the position reinforced by adoption and usage of innovation in social system" (Jin et al., 2013). The term status designates the active manipulation of one's own consumption behavior as an

extrinsic means toward the other-oriented end of achieving a favorable response from someone else (Holbrook, 1999). Social value (self-image expression and relationship support) significantly influences purchase intention in social networking communities.

***Trust**:* social influence can be described as the trust of an individual (Sharma and S. Mishra, 2020). Trust is an important antecedent of subjective norm & attitude and defined as 'service providers have to be honest, dependable, and reliable' (Yang et.al, 2017). In the context of CIoTs users, due to their respective features, trusting in service providers is a critical factor. This is because consumers might not want to be watched, followed, and controlled by third parties.

***Networking**:* The adoption, type, and persistence of consumption seem to depend on the behavior of the other members of the social system; people shape their behavior, beliefs, and attitudes through a process of peer influence (Touzani et al., 2018). Social interaction is an "activator" of the use of IoTs because sharing information with other people allows for understanding its benefits (Caputo et al., 2018). Positive social interactions drive customers' behavior in using IoTs-based products (Caputo et al., 2018).

4.2 The design space (CIoTs Features)

In the design space of 4D model, CIoTs features are the results of several processes (brainstorming, discussions, scenarios, thematic and content analysis) and are major design goals. Based on (Chang et al., 2014; Coskun et al., 2018; Pinochet et al., 2018; Shin, 2019), we identified seven CIoTs features; connectivity, interactivity, intelligence, observability, compatibility, adaptability, and safety.

Connectivity: Touzani et al.(2018) used the term ubiquity to pinpoint the importance of connectivity. It is an important feature of IoT products (Shin, 2019) as it has the ability to manage, monitor, and track objects to provide information to the user (Pinochet et al., 2018). Benamar et al.(2020) introduced object-to-object connectivity and human-to-human connectivity (social connectivity) that basically shows that connectivity is a key for interaction of IoT devices.

Interactivity: it is the timely means of information communication between consumers and devices (Chang et al., 2014; Meng et al., 2019; Shin, 2017) i.e. the ability of IoT products to react to changes in their environment. Interactivity is taken as one of the most important IoT product features in which consumers are expecting further improvement as a two-way interactive basis (Shin, 2019). Coskun et al (2018) stressed the importance of human-like interactions to bring better user experiences.

***Intelligence**:* Coskun et al.(2018) used 'ability to learn' to coin intelligence of IoT products. Intelligence is a feature that refers to the degree of automated functions, according to the operation of the IoT product (Chang et al., 2014; Pinochet et al., 2018). Intelligence will give the product the ability to make decisions based on the collected and processed data which may make users feel good about the product but the issue of autonomy may make consumers perceive the product differently.

***Observability**:* Shin (2019) used the term observability while Meng et al.(2019) and Pinochet et al. (2018) used 'feeling presence' and 'sense of presence' respectively to express the feeling that the product actually appears on the scene during the use of the product i.e. when using the device, the user fills like he is communicating face-to-face with the product. According to (Shin, 2019), users saw observability in the design stage through consumer assessment.

***Compatibility and relative advantage**:* Compatibility is defined as the 'degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters' (Shin, 2019). McDermott et al. (2019) showed compatibility is one of the important features of smart products. Relative advantage on the other hand describes ideas compatible with the existing values and norms that are better accepted than ideas that are not (Dong Shin, 2019).

Adaptability: adaptability is the ability to improve the match between its functioning and its environment (Lee & Shin, 2018). For example, in the case of Alexa, the more consumers use the product and the more it adapts to speech patterns and personal preference. Coskun et al. (2018) showed that adaptability is one of the important

features in smart products in which the ability to match its function with a respective environment may affect user experiences.

Safety *(security and privacy);* Chang et al.(2014) considered safety as one basic feature and defined it as 'the degree to which damage can be avoided, which can be applied to any vulnerable and valuable assets' while Pinochet et al. (2018) used both 'security' and 'safety' to avoid problems to personal data and an authorized involvement of third parties. Perceived security risk will affect users' intention to use smart products (Klobas et al., 2019) on the other hand, privacy concerns within the IoT are multifaceted and include technical, regulatory, and social aspects (Padyab & Ståhlbröst, 2018). Due to the ability of CIoTs to collect and share real-time data, safety will be one of the most critical features which will affect consumer choices.

4.3 Launching and post-launching space (user experience)

In the 4D model of DT process, the design space goes until delivering the solution and testing the product with a user. In this sense, our framework will give due emphasis to a post launching phenomenon (actual user experience) because consumer value resides in the consumption experience(s) derived therefrom (Holbrook, 1999). Therefore, user experiences during the actual consumption phase have to be measured, evaluated, and feedbacks have to be taken periodically. Based on (Shin, 2017; Sunder, 2014; Norman, 1999), coolness, affordance, and satisfaction are considered as dimensions in user experience.

Coolness*:* "coolness" has become an important psychological criterion, much sought after by designers, developers, and marketers of new products (Sundar S. Shyam, 2014). Cool is defined as a slang term to mean "great; fine; excellent," something that is characterized by great facility (Sundar S. Shyam, 2014). According to Sunder (2014), the coolness model incorporates uniqueness, attractiveness, sub-culture, and genuineness of a technology. For this framework, a generic 'coolness' is used as dimension for UX.

Affordance*:* Affordance theory explores the range of opportunities a technology 'affords' to its user (Naik et al., 2020). An affordance is a relation between an object (CIoTs) and a user that, through a collection of stimuli, affords the opportunity for the user to perform an action (D.-H. Shin, 2017). It is based on the notion that an actor can see different opportunities to use a product irrespective of what it is designed for (Naik et al., 2020). The common example given here is the chair. The chair is designed for sitting but it affords to stand on it to reach something higher. The "affordance" concept is particularly important in the CIoTs because designers have to be sure that they are not imposing experiences on users. Affordance may have different dimensions, but for this framework, generic affordance (preferably experience affordance) is considered.

Satisfaction*:* Overall satisfaction is the customer's feelings in response to evaluations of one or more experiences with a product (Woodruff, 1997). In Woodruff's value hierarchy model, satisfaction can be attribute-based, consequence-based (consequences from attribute performance) and goal-based across the value creation process. Sweeney & Soutar (2001) discussed the difference between value and satisfaction as value perceptions can be generated without the product or service being bought or used, while satisfaction depends on experience of having used the product or service.

4.4 Schematic representation of the framework

As shown in figure 2, consumer desired values have been identified to have nine dimensions (quality/performance, price, easy-to-use, hedonic, control, novelty, image/status, trust, and networking). These desired values drive CIoTs features which in turn enable better user experiences. The process is iterative to have always room for improvement. Coolness, affordance, and satisfaction are considered dimensions for actual user experiences.

5. Conclusion

CIoTs features are driven by consumer desires and have the potential to significantly affect user experiences. Exploring desire value at elemental levels helps us to identify the relationships in detail. In previous studies, functional value was taken usually in two dimensions (performance and money) but in this paper, we further added easy-to-use as measurable elements of functional value of CIoTs. In addition, emotional and social values are also taken as multi-facet dimensions of consumer value. Social value was considered as a stand-alone factor in previous studies but as CIoTs become advanced, social value is becoming too critical in influencing consumer

choices. As a result, we identified status/esteem, trust, and networking as elements of social value. Ultimately, CIoTs features and desired value can create a better user experience which can be evaluated through satisfaction, coolness, and affordance. In sum, the value-based framework integrating CIoTs features, desired value, and user experience in the value creation process can help designers to develop CIoTs with good experience. This paper mainly considered user preferences and design principles to create better user experiences. Future research can incorporate demography, socio-cultural contexts, and other personal factors into the framework and analyze the impact. It is also recommended to test the value-based framework empirically for a better understanding and improvement.

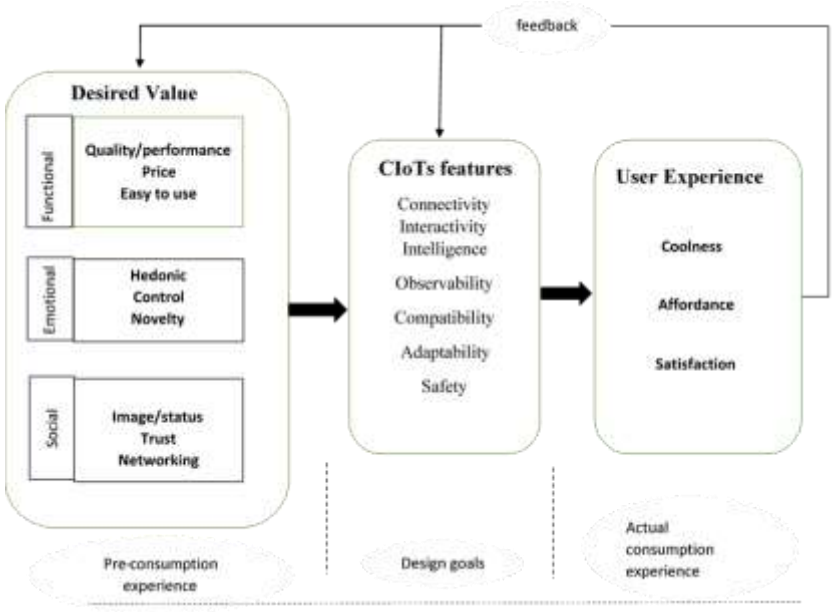

Figure 2: Value-Based framework of CIoTs

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The Role of Entrepreneurship Ecosystem in Fostering Startups Growth: Insight From Bahrain Entrepreneurship Ecosystem

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Abstract: Entrepreneurial ecosystems have emerged as an important concept for understanding the context of entrepreneurship at the macro and micro level of an organizational community. It consists of all the actors and agents that enable and constrain business startups and new ventures within a particular context. This approach of entrepreneurial ecosystem is growing in popularity and has become the focus of government policies all over the world for its high potential to support high-growth firms and to generate entrepreneur-led economic development. A key player in this context of ecosystem is the government which is involved in a booster and policymaker capacity at the different levels of the new venture creation process, by providing different kinds of support for startups and high-growth firms to become self-sustaining. This paper explores the Bahraini entrepreneurship ecosystem and identifies the key government interventions by focusing on the following: policy intervention; government finance intervention and assistance and mentoring intervention. This study shows that a more granulated understanding of the policy-maker role in monitoring the development of ecosystems and boosting startups growth and sustainability is required, with particular consideration of the diversity of the contexts and the complexity of the interactions between all actors. A quantitative approach was used, through descriptive analysis in a population of 334 entrepreneurs. The findings from this quantitative study stipulate that it is important for policymakers to revise the policy intervention in order to improve its effectiveness with regard to startups growth and success. Greater consideration of the institutional context is needed so as to have a clear understanding of how policy schemes can better support entrepreneurial activities. Besides, the results demonstrate that financial schemes and assistance and mentoring programs pose formidable opportunities for startups and new businesses to create self-sustaining cycles of entrepreneurial innovation, growth, and success.

Keywords: entrepreneurship ecosystem (EE), startup growth, government schemes, entrepreneurial success, policy intervention, contextual approach of the ecosystem

1. Introduction

Nowadays, entrepreneurship has emerged as one of the most thriving fields of study and work worldwide and particularly become a key concept in the emerging economies by providing urgent solutions to the problems of joblessness, boosting innovation, and, in turn, generating economic prosperity (Mack & Mayer, H, 2016). Therefore, entrepreneurship has become more and more acknowledged as an important driver of growth, innovation and job creation. As a matter of fact, policymakers have become gradually interested in enhancing entrepreneurship through implementing various programs and schemes to support start-ups and new ventures (Stam & Spiegel, 2016). In fact, the last two decades have witnessed a boom in the number of institutions, organizations, NGOs, practitioners offering a variety of entrepreneurship programs, actions and projects to boost startups growth and success (Spigel & Kitagawa, 2020). One reason for this increase is that entrepreneurship has become recognized as one of the foundations of successful economies and the engine of economic development. Moreover, it has been discussed and perceived as the beacon of hope for developing economies and this discussion remains topical. Within this context, both the government and the private sector in the Kingdom of Bahrain are in the process of implementing and strengthening entrepreneurship as a pivotal engine of economic development and job creation. Within this perspective and in order to spark innovation and creativity among Bahrainis, the policymakers in Bahrain, in partnership with the private sector, have established a very strong entrepreneurship ecosystem that would be devoted to developing exceptional work-ready persons who aspire to be successful entrepreneurs and have a positive and lasting impact on their society. Thus, the main mission of entrepreneurship ecosystem is to empower, support and provide potential entrepreneurs with the necessary tools to start their own startups and thrive.

A large and diversified list of entrepreneurship supporters has emerged identifying the important contribution that the private and public institutions can provide through incubation, mentorship and schemes in generating innovative and creative entrepreneurial activities (Spigel, 2017). Hence, given the importance and the rapid growth of the entrepreneurship ecosystem in Bahrain, this study aims to analyse the structure of the existing

entrepreneurship ecosystem in Bahrain and assess its role in fostering the growth of the startups. Indeed, there are several key players and support programs - financial and non-financial, public and private institutions- in this business-friendly environment that will be analysed to assess their influence on start-up's growth and success.

In the first section of this paper, the structure of the entrepreneurship ecosystem is examined. The second section provides an analysis of the role played by the ecosystem in the growth and development of entrepreneurship. The contribution that the government schemes present to start-ups' development and success is analysed in the third section. Finally, the paper concludes by discussing the obtained results and the implications of the proposed entrepreneurial framework for future practices and applications.

2. Entrepreneurship ecosystem in the literature

The notion of Entrepreneurship ecosystem has become popular in the recent years amongst entrepreneurs and policymakers (Stam. & Spigel, 2018). As demonstrated by Malecki, (2018) in his study of the bibliometric of use of the entrepreneurship ecosystem on Web of Science (WoS) and Scopus, and the study of Cao & Shi (2020) the notion of Entrepreneurial environment was the most common term used by scholars in the business literature from 1970 to 2015. The notion of entrepreneurship ecosystem (entrepreneurial ecosystem) has appeared specifically in the 2000s and become prevailing ever since 2016, as part of a large trend in entrepreneurship studies (Cao & Shi , 2020; Malecki, 2018). Other alternative concepts like entrepreneurship infrastructure, entrepreneurship system and entrepreneurship context are also used by scholars and continue to emerge, but less frequently than the ecosystem (Malecki, 2018).

2.1 Conceptualization of an entrepreneurship ecosystem (EE)

The original contribution towards the conceptualization of entrepreneurship ecosystems goes back to James Moore's research work in Harvard Business Review during the 1990s. Here the emphasis was on the role of context in promoting and facilitating the entrepreneurship process (Stam & Ven, 2021; Mason & Brown, 2014). This research was introduced as part of a shift in the entrepreneurship studies from an individual-based-entrepreneurship focus to a contextual-based entrepreneurship approach which deeply incorporated the environmental forces and context into the entrepreneurship process (Stam & Spiegel, 2016; Stam & Ven, 2021). In his research, Moore claimed that businesses don't evolve in a 'vacuum' and illustrated the relationally embedded nature of how firms interact with suppliers, customers and financiers (Mason & Brown, 2014; Moore, 1993) and how they get better business- growth opportunities in a dynamic ecosystem (Mason & Brown, 2014).

As introduced by scholars (Spigel, 2017; Stam. & Spigel, 2017; Spigel & Kitagawa, 2020; Stam & Ven, 2021) and proved by Malecki EJ (2018) in his bibliometric, the new concept of entrepreneurship ecosystem has emerged from different origins and despite its high popularity, there is not yet a broadly shared definition of this concept amongst researchers and practitioners (Stam & Spiegel, 2016). In fact, this variety of definitions can be explained with regard to the variability of ways, scales, research design, dimensions and data used to conceptualize the entrepreneurship ecosystem (Cao & Shi , 2020; Acs, et al., 2017; Malecki, 2018; Stam & Ven, 2021). The table below listed most of the definition of an entrepreneurial ecosystem, based on a synthesis of definitions found in the literature:

Table 1: Synthesis of definitions of entrepreneurship ecosystem

Author	Definition	Highlights
(Theodoraki & Catanzaro, 2021)	Sub-ecosystem interactions in establishing a consistent and effective long-term entrepreneurial development strategy in a territory	Combination of both adaptation to local specificities and global integration.
(Stam. & Spigel, 2018)	A set of interdependent factors and actors that are governed in such a way that they enable productive entrepreneurship in a particular territory.	Interaction of interdependent factors and actors in a particular context.
(Malecki, 2018)	The combination or interaction of elements, often through networks, producing shared cultural values that support entrepreneurial activity.	Interaction of elements through network
(Roundya, et al., 2018)	"Entrepreneurial ecosystem" is not a concept – or title – that is only bestowed upon certain cities or regions. Entrepreneurial activities in cities of any size and scope can be dependent on a complex system of inter-related forces.	Interaction of complex adaptive systems

Author	Definition	Highlights
(Autio & Levie, J. , 2017)	"Entrepreneurial ecosystems are regionally embedded interaction systems that drive the allocation of resources towards productive uses through the creation and scale-up of new ventures." (p. 23)	Interaction of resources systems
(Erina, et al., 2017)	An entrepreneurial ecosystem includes several players or stakeholders as well as a set of ingredients necessary to the ecosystem	Interaction of key players or stakeholders as well as important ingredients.
(Theodoraki & Messeghem, 2017)	The entrepreneurial ecosystem includes three dimensions: actors who form it and their interactions (formal and informal network), physical infrastructure, and culture. (p. 50)	Interaction of three dimensions: actors, physical infrastructure, and culture.
(Spigel, 2017)	Entrepreneurial ecosystems are combinations of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures. (p. 50).	Interaction of social, political, economic, and cultural elements.
(Roundya, et al., 2017)	Communities of agents, social structures, institutions, and cultural values that produce entrepreneurial activity (p. 99)	Interaction of agents, social structures, institutions, and cultural values.
(Gauthier, et al., 2017)	We defined ecosystems ... around the concept of a shared pool of resources generally located within a 60-mile (100-km) radius around a center point. (p. 24)	Shared pool of resources in a particular territory.
(Mack & Mayer, H, 2016)	EE are defined as the interacting components of entrepreneurial systems, which foster new firm creation in a specific regional context. (p. 2120)	Interaction of entrepreneurial system components in a regional context.
(Stam, 2015)	A set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship (p. 1765)	Interaction of actors, factors and elements in a community.
(Mason & Brown, 2014)	A set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (e.g., firms, venture capitalists, business angels, and banks), institutions (universities, public sector agencies, and financial bodies), and entrepreneurial processes (e.g., the business birth rate, numbers of high growth firms, levels of "blockbuster entrepreneurship," number of serial entrepreneurs, degree of sell-out mentality within firms, and levels of entrepreneurial ambition) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment. (p 9)	Interaction of entrepreneurial actors, entrepreneurial organizations, institutions, and entrepreneurial processes.
(Vogel, 2013)	"…an interactive community within a geographic region, composed of varied and interdependent actors (e.g. entrepreneurs, institutions and organizations) and factors (e.g. markets, regulatory framework, support setting, entrepreneurial culture), which evolves over time and whose actors and factors coexist and interact to promote new venture creation." (p. 6)	Interaction of varied and interdependent actors and factors within a geographic region.
(Qian, et al., 2012)	"economic, social, institutional and all other important factors that interactively influence the creation, discovery and exploitation of entrepreneurial opportunities" (p. 562)	Interaction of important factors that influence entrepreneurial opportunities
(Isenberg, 2011)	"Entrepreneurship ecosystem consists of a dozen or so elements (which we consolidate into six domains including policy, finance, culture, supports, human capital, and markets) that, although they are idiosyncratic because they interact in very complex ways, are always present if entrepreneurship is self-sustaining."	Interaction of six domains including policy, finance, culture, supports, human capital, and markets.
(Isenberg, 2010)	"The entrepreneurial ecosystem consists of a set of individual elements – such as leadership, culture, capital markets, and open-minded customers- that combine in complex ways." Nine principles are proposed to integrate these elements into a holistic system: "1) stop emulating Silicon Valley; 2) shape the ecosystem around local conditions; 3) engage the private sector from the start; 4) favor the high potentials; 5) get the big win on the board; 6) tackle cultural change head-on; 7) stress the roots; 8) do not over-engineer clusters; help them grow organically; 9) reform legal, bureaucratic, and regulatory framework." (p. 3).	Interaction of individual elements combined in complex way.

Author	Definition	Highlights
(Cohen, 2006)	"Entrepreneurial ecosystems represent a diverse set of interdependent actors within a geographic region that influence the formation and eventual trajectory of the entire group of actors and potentially the economy as a whole. Entrepreneurial ecosystems evolve through a set of interdependent components which interact to generate new venture creation over time" (pp. 2–3).	Interaction of interdependent actors within a geographic region.
(Spilling, 1996)	"The entrepreneurial system consists of a complexity and diversity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region or locality."	Interaction of complexity and diversity of actors, roles, and environmental factors in a particular locality.

Many different definitions have been proposed by scholars as summarized in Table. I to define the concept of Entrepreneurship Ecosystem (EE). Most of the selected definitions present EE from the territorial perspective and consider it as the combination or interaction of a set of physical or non-physical elements, agents, actors, contextual dimensions, institutional and organizational factors (Cao & Shi , 2020). All these studies investigate the EE through a comprehensive network connection approach where external agents of the entrepreneurial system systematically interact to enable productive entrepreneurship and produce supportive environment for innovation-based ventures (Schrijvers, et al., 2021; Roundya, et al., 2017; Roundya, et al., 2018). The systematic union of these localized elements predominantly determine the success of the entrepreneurial activity and represent a critical tool for creating resilient economies based on entrepreneurial innovation (Malecki, 2018).

In fact, the systematic condition in the interaction process between the EE elements and agents was at the heart of most of the proposed definitions (Table 1). However, quite little attention was given to the level, strength, quality and dynamic of the interaction between these elements (Schrijvers, et al., 2021; Theodoraki & Catanzaro, 2021). To tackle this gap, scholars (Schrijvers, et al., 2021; Theodoraki & Catanzaro, 2021; Malecki, 2018) have introduced the dynamic approach of EE which considers the multi-levels and variable configurations of the interactions between the different elements of the system.

2.2 Entrepreneurship ecosystem in Bahrain

Bahrain is perceived as the Gulf's sweet spot thanks to its very strategic and cost-effective location as it lies at the heart of one of the world's fastest growing regions. Although the Covid 19 crisis, Bahrain economy is estimated to rebound in tandem with the recovery of the global economy. Besides, Bahrain is considered to be the fastest and cheapest connections to the GCC by road, sea and air. In fact, the extensive analysis of the economic ecosystem and all the related indicators highlights the need for entrepreneurial ecosystem to support a strategic entrepreneurial development in the market. This would serve as a promoter of startups growth, a driver of entrepreneurship and innovation in the region, and a source of trust for all kind of businesses.

As a matter of fact, the entrepreneurship ecosystem has drastically evolved over the last past six years in Bahrain. From government driven initiatives focusing on building awareness and providing supports, a whole cultural movement towards a more entrepreneurial society has been revealed from both the public and private sector in Bahrain (Almajdoub, 2018). It's understood from this entrepreneurial movement, that both the public and private sector are aligned as to the importance of building an entrepreneurial economy that encourages a culture of self-employment, innovation and entrepreneurship among Bahraini youth. A culture in which job creation is perceived as attractive and rewarding is a priority that underpins the success of the Entrepreneurship-to-self-employment initiatives (EDB, 2018).

This strategic redirection has resulted in a gradual change, varying across different industries, towards a much greater emphasize on support for growth-oriented entrepreneurship and innovation activities (Almajdoub, 2018). The consequence is that policy makers in Bahrain are now strongly focused on promoting high growth startups and Innovation-led ventures (EDB, 2018). The rationale for this focus is that entrepreneurship and Innovation are thought to drive productivity growth, increase international competitiveness and enable sustainability.

Furthermore, the policy makers interest in enabling productive entrepreneurship, can be explained largely in one raison which is "job creation and economic growth". In fact, startups and high-growth ventures do not only create new jobs they also have great spill-over impacts that are valuable to the growth of other businesses in

the same territory and industrial cluster (Mason & Brown, 2014). Thus, policy makers have led the diversification thrust and played a facilitator role towards development in terms of creating business-friendly environment that supports Innovation-led ventures and provide an important stimulus within the local economies by increasing competition, promoting innovation and increasing the efficient allocation of resources across the different industry clusters. This enterprising orientation has also been proven by the rising number of startups and the high concentration of technology-based ventures in Bahrain which have grown by 46.2% over the last 3 years. Bahrain's startup scene is expanding at a very rapid pace and includes companies within software development, E-Commerce, cybersecurity, health-tech, E-learning, and fintech (Almajdoub, 2018). Moreover, according to the World Bank's 2020 Doing Business report (The World Bank, 2020), released in May 2019, Bahrain ranks second in the GCC and MENA region and 43th globally out of 190 economies for ease of doing business. The report reveals that globally Bahrain is highly ranked, worldwide and in the GCC, in terms of several factors and indicators related to entrepreneurship ecosystem such as starting a business, trading across borders, protecting minor investors, enforcing contracts, getting credits and registering property (The World Bank, 2020)

To further reinforce this entrepreneurial orientation, the kingdom has embarked upon setting a robust and prudent development agenda to successfully navigate the country to socio-economic prosperity. Through the adoption of a very comprehensive national development planning framework as part of the Vision 2030, the government builds on the principles of competitiveness, sustainability and fairness, that would be supported by the Public-Private- Partnership (PPP) program. This program focuses on potential partnership between the public and the private sector and provides value- opportunities to creating an environment highly conducive to entrepreneurship and innovation, improving access to capital for SMEs, and access to venture capital for business in general and establishing a platform for advancing innovations to market readiness (EDB, 2018).

At the operational level, the government's approach to the implementation of this program has begun with the development of a business-friendly ecosystem that supports greater diversification of the economy and contributes to the improvement of the investment conditions and quality of innovation-led outcomes in an inclusive and competitive manner. As such, the Bahraini government has taken the lead to facilitate the entrepreneurial process by offering multiple schemes to investors and entrepreneurs to start, grow and sustain their startups such as offering low operating costs, attractive regulatory environment, a competitive taxation system, training and mentoring programs, 100 percent foreign ownership allowed in most sectors and a striving ecosystem to incubate and accelerate the start-ups growth and success (EDB, 2018).

Given that EE significantly impact entrepreneurial activities and start-ups growth and success, it is essential to consider the most influential elements of the system and think about the best ways to manage them. It will also be worthwhile to explore other aspects of EE into to maximize start-ups success and growth. In fact, this research aims to examine the role of the following elements of the EE in Bahrain: government policies, public finance schemes and training and mentoring programs towards achieving start-ups' growth and success.

3. Methodology

This research study focuses on the role of government schemes as part of EE in fostering start-ups growth and success in the Bahraini context. The target population comprises all elements defined before selecting the sample (Malhotra, 2007). The sample pool for this research consisted of local entrepreneurs who have initiated their own startups and got support from the local EE. For this study, a non-probabilistic convenience sampling method was used to get the sample unit and recruit conveniently reachable entrepreneurs. The researchers approached 334 Bahraini entrepreneurs who have startups operating in different industries to complete a self-report questionnaire and collect data for this research.

An online questionnaire has been administrated and used to collect the data. The questionnaire was structured into sections. The first section was designed to collect the demographic data and the second one was relate to the offered governmental schemes and their contribution to the entrepreneurial success. A five-point Likert scale was used to measure the variables constructs elements. Participants were asked to respond to the questionnaire on a range from 1 = strongly disagree to 5 = strongly agree.

Out of 334 surveys distributed to local entrepreneurs, 262 valid responses were received, representing a response rate of 78% of the sample. To guarantee clarity, the survey was reviewed and validated by three subject experts and distributed first as a pilot test to 50 respondents before distributing it to the entire sample.

Statistical analysis of the data collected on the entrepreneurial ecosystem dimensions and their impact on startups' success are presented in the following sections. The questionnaire results are analyzed by SPSS 22.0.

4. Participants' profile

A total of 262 local entrepreneurs participated in this study (57% female; 43% male). Most respondents (78%) were aged 25 to 45. This sample consisted of 67% of bachelor's degree holders, 25% with master's degrees, and 7% were high school diploma holders. It is worth noting from our sample results that the highest percentages of respondents possess a bachelor's degree, which is usually the ideal educational level for self-employment. 26 % of the participants claimed that they have started their businesses for more then 2 years. Of the entire population, 28% reported having 2 to 5 years of work operation, and 24% have been operating for 6 to 10 years in the market. For 11% of participants, business operation lasted more than 20 years. Additionally, almost half of the participants (55%) indicated they have between 1 and 10 employees, 26% have up to 50 workers, and 19% have more than 50 workers (see Table 2).

Table 2: Participants profile

	Participants profile	Percentage
Gender	Male	43
	Female	57
Age	18-24	14
	25-45	78
	46 or older	8
Educational Level	Secondary degree	3
	High School Diploma	5
	Bachelor's degree	67
	Master's degree	25
	Doctoral degree	0
Years of Business Operation	< 2 years	26
	2- 5 years	28
	6 – 10 years	24
	11-20 years	11
	More than 20 years	11
Number of staff employed	1 - 10	55
	11 – 50	26
	51- 100	9
	100 - 200	10

In terms of chosen industry to perform their activities, the most representative categories of participants were operating in the Retail sector with 61%, Construction and Design 7%, Manufacturing 7%, E-Commerce, 6%, and Marketing and advertisement 2% (See Figure.1).

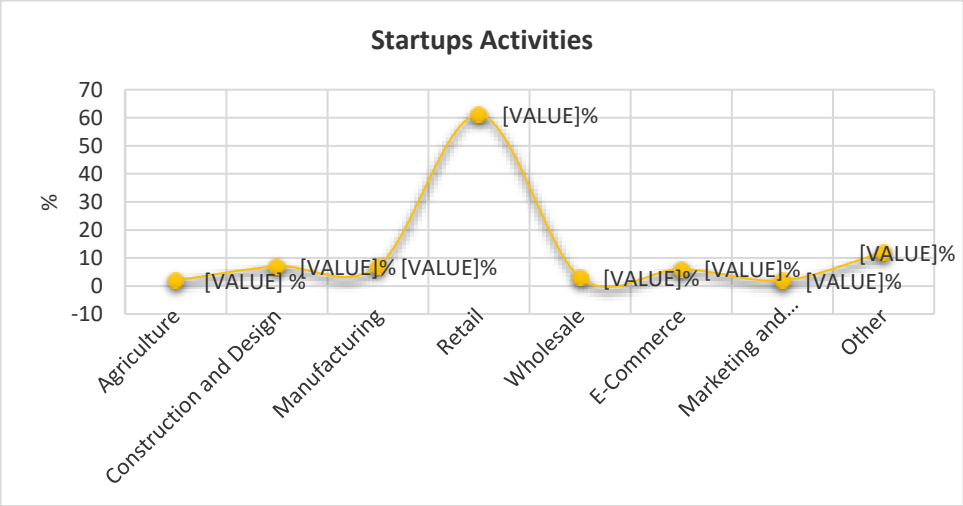

Figure 1: Types of startup activities

5. Data analysis and results

Descriptive statistics of the data collected on the entrepreneurial ecosystem schemes in Bahrain are presented in figure 2 & 3. The results this analysis will be discussed in the thereafter section.

Figure 2 shows the value related to the participants' main motives to apply for a government finance schemes. The obtained results indicate that there is substantial variation in the values of the different motives that would potentially incite an entrepreneur to seriously consider applying for a public financial support program. The highest value is attributed to the entrepreneur strong desire to start their own startups and be self-employed with 34%. In contrast, 21% of the entrepreneurs claimed to use these funds to expend their business as part of their growth strategy. Increasing working capital was also the main drive to acquire government finance schemes for up to 15% of the participants. Only 10% admitted that they had used this government finance support to finance a new product development cycle. 6% of the participants claimed that the government finance schemes have helped them consolidate their debts (see Figure. 2).

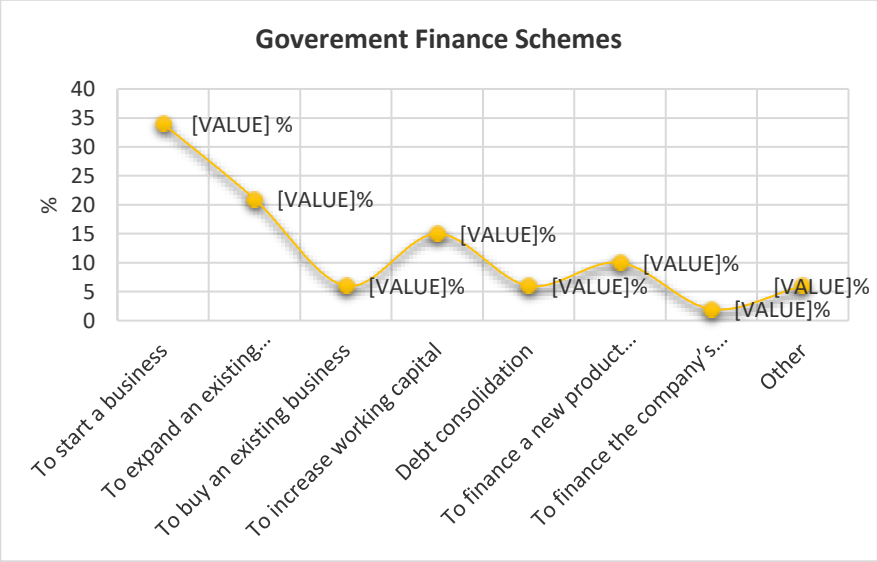

Figure 2: Purpose of government financing support schemes

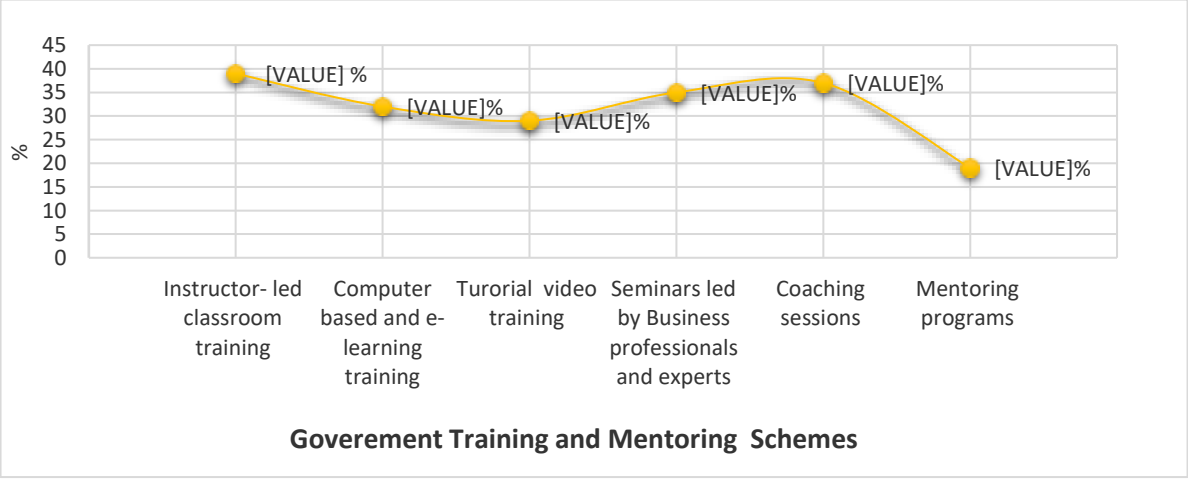

Figure 3: Type of government training and mentoring support received

Participants have subsequently discussed and elaborated on the assistance and mentoring elements of the Bahraini entrepreneurial ecosystem. Some participants, for example, emphasized the interaction between the entrepreneurs and startup's mentors-coaches through networking and connecting events and programs. Other participants have acknowledged the enabling role of the government in the background to allow an open access

to all kinds of relevant training and seminars led by professionals and experts in the field (talent, mentors, coaches, advisors, trainers, etc.) (See Figure. 3).

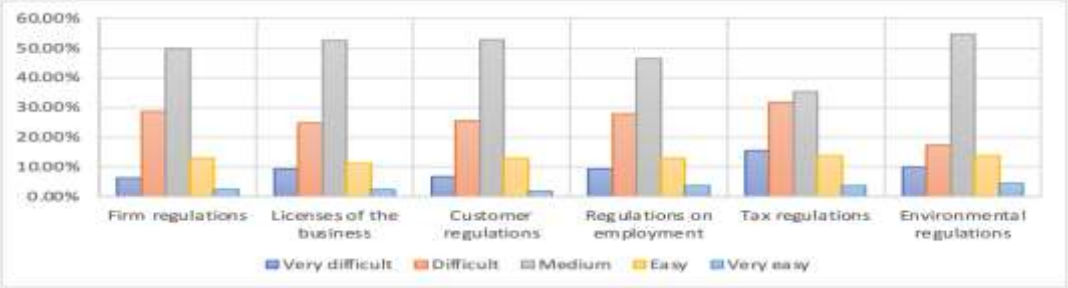

Figure 4: Ease of doing business in relation to available regulation framework

Figure 4 shows the participants rating of the regulation framework elements vis-a-vis the whole startup's creation process. These data provide a first empirical evaluation of the effectiveness of the startups policies in promoting the Bahraini ecosystem and enabling new perspectives on firm growth and success. Participants believe that the current start-up policies have proved to have moderate effectiveness in increasing the number of startups and small business. In fact, the objective of these policies is to stimulate the key processes of startups' development and the emergence of a variety of entrepreneurial support and assistance programs by improving the environment that surrounds such kind of firms. From a policy perspective, most respondents rank the indicators related to the ease of doing business in Bahrain between moderate to no difficulties. This framework refers to the number and type of procedures, time, cost and paid-in minimum capital requirement for a small- to medium-sized firm to start up and formally operate in the local context (The World Bank, 2020). The discussed policies include firm regulations, licensees to initiate a business, tax regulation, regulation on employment and environmental regulations.

6. Conclusion

As mentioned earlier, most of the studies about entrepreneurial ecosystem have been tackling the concept through a qualitative (theoretical) approach that provides an extensive description of the ecosystem structure and constituents. However, these studies do not provide details about how these constituents are related to the local context and to the entrepreneurial process outcome. This research provides a qualitative (theoretical) and quantitative (empirical) contributions in defining the entrepreneurial ecosystem and measuring the relation of its constituents with the entrepreneurial outcomes. From a theoretical perspective, it bridges significant research gaps concerning patterns of entrepreneurial ecosystem constitution and clusters and their resulting entrepreneurial outcomes in a particular territory. In fact, an in-depth analysis of the current and fragmented literature demonstrates that the concept of entrepreneurial ecosystem has shaped and linked a variety of intellectual nodes advanced by scholars from different disciplines, all trying to explain the motives and benefits behind the clustering of individual firms within a given territorial space. The entrepreneurial ecosystem concept has proven to be efficient in explaining how clusters of different economic activities, actors and elements interact together in a dynamic way to offer new opportunities and perspectives for startups and new ventures to grow, sustain and thrive.

From a structural and operational perspective of the entrepreneurship ecosystem, first, it's important to stress the leading role of the government as a key player and monitor of the entrepreneurial ecosystem rather than a simple facilitator of the process. In fact, the government has the competence and all the needed mechanisms and resources (financial, talent, skills, network, infrastructure, authority, power, tools) to intervene directly and indirectly as a key contributor to drive the growth of the entrepreneurial ecosystem by encouraging, facilitating and enabling both new and incumbent businesses. Second, the government should use real-world information about local start-ups' specifications and development requirements and put it into an inventory system, apply a set of consistent measurements and polices and offer an appropriate regulatory framework for all actors who are involved with the local EE or playing crucial roles in facilitating elements of the ecosystem. This will lead to a deeper understanding about legal requirements for setting-up and developing start-ups across the different stages of its life cycle. Third, the financial dimension of the EE framework has important implication for individual entrepreneurs. It emphasizes that any given new venture is, as one actor, able to access only limited sources of funding while it requires many other financial sources to perform, sustain and thrive. As a consequence, we argued that such firms require more customized and collaborative financial support, such as

strategic finance guidance, access to capital opportunities and achievement of IPOs, from different finance providers, to help foster their entrepreneurial conduits (Mason & Brown, 2014).

To conclude, this paper aimed to unveil the dynamics of the entrepreneurial ecosystem in the Bahraini context. This research demonstrated that the entrepreneurial ecosystem enables start-ups and Small businesses to achieve better financial and entrepreneurial performance.

Besides, this study established a comprehensive framework based on qualitative and quantitative data that clarifies the relationship between entrepreneurial ecosystem factors (government policies, public finance schemes and training and mentoring programs) and startups' entrepreneurial performance.

7. Limitations and future scope

An in-depth examination of the effect of some additional social, cultural, economic, industrial and personal factors lies beyond the scope of this paper. However, we encourage future researchers to take up our initial findings on local EE and further examine the interplay of the above-mentioned factors (social, cultural, economic, industrial and personal factors) with the entrepreneurial outcomes.

Our research analysis is based on a small sample (only 262 observations) in one specific region (Bahrain). To obtain more strong findings, this analysis should be repeated in other regions (for example other GCC countries such as UAE, KSA and Qatar, North Africa or Asian countries, etc.) for different companies' sizes (startups, small, medium and large companies). This would also allow for feedback effects of the business ecosystem on the companies' competitiveness. Besides, an in-depth examination of the effect of some additional social, cultural, economic, industrial and personal factors lies beyond the scope of this paper. Thus, more analyses should also be repeated to take up our initial findings on local EE and further examine the interplay of the above-mentioned factors (social, cultural, economic, industrial and personal factors) with the entrepreneurial outcomes. Likewise, future studies may also include also across borders analysis by comparing between different entrepreneurship ecosystems in different regions and assessing their contribution towards raising startups growth and development.

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The Effect of Viral Marketing Using Social Media on Small and Medium Enterprise‘s Brand Awareness: Evidence From GCC Market

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Abstract: The massive use of the technology and social media platforms has dramatically changed consumer behavior and the ways in which entrepreneurs manage their business and commercialize their product and services. Digital marketing offers significant opportunities to small and medium enterprises through lower marketing and advertising costs, improved advertising process, better brand recognition and increased sales. This study brings together the collective insight from customers and small business owners on issues related to viral marketing usage through social media platforms and its impact on customers' brand awareness. The consumers' perspectives offer valuable details about key aspects of viral marketing and social media as well as perspectives on more specific dimensions including social currency, emotional connections and practical values. This research offers a significant and timely contribution to both researchers and business owners on how to use effectively viral marketing strategies to enhance online brand presence and raise customers awareness. Although numerous studies have examined consumer behaviors on social media as applied by incumbents' businesses, only a handful of studies have explored this concept for Small and Medium Enterprises. Considering this gap, the current study analyzed the utilization of viral marketing by SMEs to increase brand awareness and online presence. A hypothetical deductive approach was used, through regression models, in a population sample of 282 online social media users within the GCC context to study the effect of viral marketing strategies on SMEs brand awareness. The findings from analyzing viral marketing and brand awareness relationship reveal that social currency, emotional connection and practical value have a growing influence on SME's brand recognition. However, the participants view that social currency particularly has the greatest influence on raising the brand awareness compared to other viral marketing constituents.

Keywords: viral marketing, SMEs brand awareness, social media platforms, digital marketing, social currency, emotional connection, practical value

1. Introduction

With the development of Internet and technology, online social media nowadays is used by companies as a means to introduce their products and services into the market, influence the consumers behaviors and build their brand name by reinforcing their online presence and raising consumers' awareness and loyalty. In fact, digital marketing tools have dominated the marketing strategies being implemented by companies worldwide across all sectors (Dwivedi, et al., 2020). This rapid growth of social media platforms has offered new marketing and business opportunities for companies especially during the covid 19 situation where users and potential customers can be reached faster and more efficiently through social media platforms such as Facebook, Instagram, snapchat and YouTube (Larson, 2009). These digital marketing platforms can help large, medium and small businesses spread viral messages to the mass virtual market (Watanabe, et al., 2021). Moreover, due to an open and multidirectional interactions among a large number of online users, information on social media spreads very quickly with limited control following a multi-interactional diffusion dynamic similar to an epidemic (Bhattacharya, et al., 2019). This phenomenon offers effective and advantageous alternative marketing practices to smaller to medium sized companies which often lack the required resources for using traditional forms of marketing and advertisement (Andocsová, et al., 2018). Hence, cost-effective advertising and marketing options such as sponsoring ads, event-based marketing, blogging, and moreover viral marketing are appearing and increasingly becoming important elements of today's digital marketing strategies and necessary conditions to make an advertisement campaign more sustainable with substantial efficiency (Bhattacharya, et al., 2019). Hence, understanding these newer toolkits of communication and information diffusion is very crucial for companies for deciding their advertising, brand awareness and marketing strategies (Larson, 2009).

In fact, such powerful communication techniques have proven their effectiveness to increase brand awareness of incumbents Businesses and in this paper, we will investigate its effect on SMEs brand awareness. Thus, the current study analyzes the concept of Viral marketing as used by SMEs in the GCC context and assesses its ability

to actively infects a subset of social network's users by actively engaging then and raising their level of brand awareness.

2. Literature review

2.1 Small and medium enterprises' growth in GCC

In the past 10 years, economies across the Gulf Cooperation Council (GCC) have shown an exponential growth of SMEs', varying from fashion shops, restaurants to tech-startups creating as such a very competitive red ocean market. These gulf-based SMEs are predicted to grow by 156% in the upcoming 5 years presenting a potential of $920 billion1 added value to the GCC economy with 22 million jobs to be created. Additionally, experts in the region are envisaging a "SMEs Booming" in the GCC as an emerging batch of businesses out of the Covid-19 context. Accordingly, both government and private sector in the GCC are in the process of implementing various recovery strategies and programs in order to strengthen SMEs as a pivotal engine of economic development and job creation and drive sustainable economic growth during the upcoming, "Startup Growth Era", post Covid-19 pandemic.

This strategic redirection on rebuilding the economy and supporting SMEs diversification has been led by the GCC governments who have played a facilitator role towards realigning their economies to the fast-evolving needs of the digital era. As such, a friendly- business environment that supports SMEs prosperity and increase an efficient allocation of resources across the different industry clusters and a forward-looking policy which encourage innovation have been introduced alongside with a customization of emerging digital trends in order to match the unique needs of SMEs in the GCC. This enterprising orientation has also been proven by the rising number of SMEs in the GCC which have grown by 46.2% over the last 3 years (The World Bank, 2020). GCC SMEs scene is expanding at a very rapid pace and includes companies within software development, fashion, food and beverages, E-Commerce, cybersecurity, health-tech, E-learning, and fintech.

To further reinforce this orientation, SMEs owners have embarked upon setting a visionary and growth-oriented agenda to successfully navigate their small businesses to greater economic growth. Through the adoption of a digital-oriented development strategy, Business owners build on the principles of competitiveness, sustainability and market share growth, that would be supported by efficient digital marketing campaign to increase the online presence of their brands and create more awareness about them (Jankowski, et al., 2018). The online marketing trends using viral marketing means as applied by SMEs owners will be addressed in the next section.

2.2 Social media and viral marketing

Internet, new technologies, social media, smartphones, artificial intelligence, IoT and other digital communications technologies are all around us and playing an active role in our everyday life and are changing the way we live, learn and do business. Every time we open our social media newsfeed, do a Google search, order a product from Amazon or book a trip online from an application, technologies is lurking in the background. According to recent statistics for January 2021, 4.66 billion people are active internet users worldwide, encompassing 59.5 % of the global population. Out of this total, 92.6 percent (4.32 billion) accessed the internet via their mobile devices (Statista , 2021). Besides, the last few years have been marked by an unprecedented social media high usage worldwide. According to 2021 statistics, 4.2 billion people are active social media users worldwide. And this number is projected to increase to almost 3.43 billion by 2023 (Statista , 2021). While using social media, people spend an increasing amount of time creating and sharing content, searching for information about products and services, sharing their experiences, thought, opinions, feelings and attitudes with other users and engaging and providing feedback to companies (Larson, 2009).

With this exponential increase of the social media usage and the acceleration of technology-driven change in the consumer behavior, companies become more aware about the importance of shifting the way communication and information sharing occur and interaction with consumers happen (Watanabe, et al., 2021). And subsequently, they have changed their approaches in advertising about their product and services and in connecting and interacting with costumers by making digital and social media an essential and integral component of their business marketing plans (Dwivedi, et al., 2020) and recognizing the need to continually monitor social media platforms and manage digital marketing activities accordingly (Watanabe, et al., 2021).

[1] This is according to a new study by MENA Research Partners (MRP)

In fact, digital and social media marketing have offered different opportunities to companies by allowing them to achieve their marketing objectives in a cost-effective way (Watanabe, et al., 2021). For instance, many companies have used social media platforms such as YouTube and snapchat to widen the scope of their brand market presence by reaching an international audience (Jankowski, et al., 2018; Huang, et al., 2019). Moreover, more than 50 million registered businesses companies are using Facebook and Instagram for advertisement and over 88 % of businesses use Twitter for their marketing plans (Watanabe, et al., 2021). Social media platforms and digital marketing have also been widely used as well by companies for creating brand awareness and reinforcing consumer loyalty by building personalized relationships with the customers. (Dwivedi, et al., 2020)

As a matter of fact, scholars and practitioners claim that in the era of digital media companies must view the customers as collaborator in conducting the marketing and communication process and must engage them in a personalized purchase experience where they can communicate and share their though and opinions about products and services with the company and other users. Then, these purchasing experiences will be spread by the customers to family, friends and other people in their social media networks (Larson, 2009). This reference process is recognized in the traditional marketing as Word of Mouth (WoM) communication and is usually considered as a powerful and influential communication tool (Larson, 2009). Viral marketing has appeared as the digital form of WoM communication and refers to the passing on or referring process of news, information or entertainment to another person (Dwivedi, et al., 2020).

The original contribution towards the conceptualization of Viral marketing goes back to Datta, et al., (2005) who have defined viral marketing as "marketing techniques that seek to exploit pre-existing social networks to produce exponential increases in brand awareness, through processes similar to the spread of an epidemic" (p. 72) (Larson, 2009) . Datta, et al., (2005) confirm that this digital form of the WOM occurs through many online mediums, including "*posted reviews, web-based opinion platforms, boycott web sites, news groups, mail bags, discussion forums, personal e-mails, chat rooms*" and many other formats including blogs and social media platforms and networks ((Datta, et al., 2005; Larson, 2009). In fact, this concept was firstly used to refer to certain marketing practices used by Hotmail in 1996 where they have incorporated a promotional tag on outgoing emails that helped them gain 12 million subscribers within a year and half only (Fartina, 2016).

Viral Marketing is a powerful and highly effective digital marketing tool that influence consumers' opinions about products, services, brands, companies, corporate reputations and so forth (Gonçalves, et al., 2018) and to succeed companies need to understand their online consumers' behaviors, expectations, needs, desires and opinions and then provide a better value than other competitors (Watanabe, et al., 2021). For instance, companies such as Facebook and Uber have successfully added viral marketing into their business models and have generated accordingly various benefits (Fartina, 2016) .The viral marketing phenomena relies on the principle that consumers will use their interpersonal social media networks and platforms to share content about the brand with their family, friends and their whole social media networks. This way of communication and information sharing between users themselves and users and companies will transform the existing communication platforms into influencing platforms that companies can use to influence consumers and encourage them to create and share brand content with others (Gonçalves, et al., 2018).

Another key to viral marketing is the voluntary digital referrals conducted by consumers to create awareness, peak interest, influence purchasing decisions and gain sales (Jankowski, et al., 2018) . Successful viral marketing campaigns consist of the creation of engaging, compelling and viral content that takes advantage of a variety of technologies to create a brand equity of a product offered (Hendrayati & Pamungkas, 2020; Fartina, 2016) (Hendrayati & Pamungkas, 2020)

2.3 Viral marketing practices for SMEs

Some research studies have revealed that SMEs may not be very successful in applying viral marketing due to a lack of competence and low level of awareness and organizational readiness for adopting this new approach of interaction with customers (Dwivedi, et al., 2020; Watanabe, et al., 2021). However, there are some companies that have embraced very successfully viral marketing campaigns and gained increased positive brand awareness and thereby higher sales (Larson, 2009) .One of the successful viral marketing campaigns was the "Let's Say Thanks" campaign by Xerox (Larson, 2009). This campaign has allowed the customers to create and send "heart-felt" message to military personnel globally and the result was more than 1.5 million "heart-felt" messages were sent from the company web site in the first month alone (Larson, 2009). Besides, "Let's Say Thanks" campaign

has helped the company raise its brand equity at no cost thanks to the very high media coverage achieved. Other examples of successful viral campaigns on social media are "Like A Girl" , the "Ice Bucket Challenge", "Share a Coke" that was implemented by Coca-Cola (Fartina, 2016) as well as "Last Selfie" campaign that was sponsored on snapchat by "World Wildlife Fund (WWF) (Jankowski, et al., 2018).

In the GCC context, there are multiple researched examples of small businesses that have capitalized on this new marketing trend and reaped increased customers' interest. For example, the viral marketing campaign unveiled by the Kuwaiti coffeeshop Café Mug "Coffee house's Ad. The campaign went viral in 2017 due to claims that the ad includes symbols related to the decapitation of Starbucks's iconic mermaid mascot (Fartina, 2016). Another example of a Kuwaiti fashion retail brand "Boutikee Casual Chic" that has implemented a viral marketing campaign with its #bent_almeekh ad campaign to boost sales of its brand (Gonçalves, et al., 2018). Both of these campaigns have taken advantage of the negative buzz created around the ads to increase band awareness and catch consumers' attention (Huang, et al., 2019).

Although there is a growing number of companies in the region that are significantly involved in the utilization of viral marketing through social media, however there is still an immense need to have more SMEs incorporating social media into their current integrated marketing and communications strategy.

3. Conceptual model and research hypothesis

This study assesses the effect of viral marketing on SMEs' brand awareness in the GCC context. To this end, a conceptual model is elaborated, which focuses on the impact of three viral marketing constituents on consumer's ability to recognize SMEs brands and promote it on social media. This model stands on the assumption that a well-developed viral marketing campaign may help in reinforcing the corporate online presence, actively engaging consumers in a brand value co-creation process and raising consumers' awareness about the brand and thereby increase the level of sales. (See Figure 1. Conceptual model).

Based on the model, we formulate the following research hypotheses:

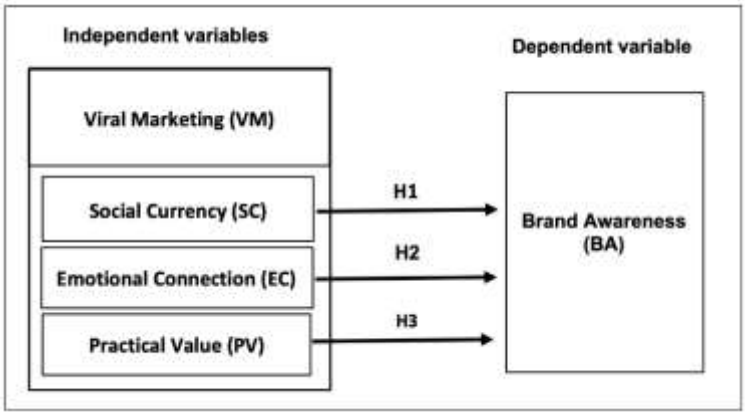

Figure 1: Conceptual model

The success of SME's Viral Marketing strategies depends on numerous factors, which would potentially affect different aspects of this marketing strategy that are related to how, when and where to implement this strategy and considering carefully these factors will certainly assist in reaping various benefits and advantages (Fartina, 2016).

In particular, scholars and practitioners (Fartina, 2016; Akpinar & Berger, J, 2017; Agam, 2017; Jankowski, et al., 2018) stipulate that the success of the virality process is usually driven by the following six factors that should be considered in integral to ensure a successful viral campaign: Social currency, Triggers, Emotion connection, Public, Practical value and Stories (Esmaeilpour & Aram, F, 2016; Bhattacharya, et al., 2019). These factors refer to elements such as attracting attention by giving away valuable products to customers, creating a viral content that ca be easily transferred through any network and social media platform, taking advantage of human social connection and basic motivation such as emotion and positive feelings (Esmaeilpour & Aram, F, 2016).

In our study, only three factors were chosen due to the similarity and conclusiveness of some factors with others. In fact, social currency construct comprises of both, Public and Stories constructs as they all provide exclusivity and a sense of belonging to a certain community or group that share a common desired perceived image about themselves and their lives (Fartina, 2016). Thus, combining all the three factors under the umbrella of "Social currency" would reduce the risk of multicollinearity between the variables.

***H1**: Social Currency has a significant impact on Brand Awareness.*

Furthermore, in the proposed model, the generated emotional connection depends on the level of stimulation triggered by the viral ads assuming a user is more likely to adopt a product if positive emotional reactions are provoked, while taking into account that emotional responses whether positive or negative varies overtime due to a memory-triggering effect. Subsequently, emotional connection construct and triggers will be jointly analyzed under the label "Emotional Connection" (Fartina, 2016; Dwivedi, et al., 2020).

***H2**: Emotional Connection has a significant impact on Brand Awareness.*

With reference to practical value, users are more likely to share a social media content if they perceive it useful, attractive, beneficial and of high practical value for them and for their networks. Thus, when coming across a message about product or service with high perceived practical value people are usually inclined to share this content with their social networks (Akpinar & Berger, J, 2017; Agam, 2017).

***H3**: Practical Value had a significant impact on Brand Awareness.*

4. Methodology

This research study focuses on the the impact viral marketing through social media on consumer's brand awareness in the Bahraini context. The target population comprises all elements defined before selecting the sample (Malhotra, 2007). The sample pool for this research consisted of online social media users within the GCC context. For this study, a non-probabilistic convenience sampling method was used to get the sample unit and recruit conveniently reachable online customers from both genders in the GCC region. The researchers approached 320 individual social media platforms users of both gender across the GCC to collect data for this research.

An online questionnaire has been administrated and used to collect the data. The questionnaire was structured into sections. A five-point Likert scale was used to measure the variables constructs elements. Participants were asked to respond to the questions on a range from 1 = strongly disagree to 5 = strongly agree.

Out of 320 surveys distributed to social media users across GCC who are performing online purchases, 282 valid responses were received, representing a response rate of 88% of the sample. Besides, to ensure clarity and accuracy, the survey was reviewed and validated by three subject experts and distributed first to 50 pilot respondents before distributing it to the entire sample.

4.1 Participants' profile

A total of 282 individual social media users in the GCC participated in this study (77.5% female; 22.5% male). Most respondents (68.1%) were aged 18 to 34 (30.2% aged 18-24 and 37.9% between 25 and 34). It is worth noting from our sample results that the highest percentages of respondents are aged between 18 and 34, which is usually the age of intensive use of social media platforms. This sample consisted of 59.8 % of bachelor's degree holders, 1.6 % with master's degrees, 24.2% are at the intermediate level and 9.3 % were high school diploma holders. These results indicate that the majority of respondents are educationally qualified with university degrees. With reference to social media usage, 43.4 % of the participants claimed that twitter is their favorite social media platform. Of the entire population, 30.22 % reported using Instagram mostly, and 10.44% have been using Facebook. For 5.5 % of participants, snapchat is the most used social media platform. (See Table 1).

Table 1: Participants profile

		Percent
Age	17 or Younger	13.2%
	18-24 years	30.2%
	25-34 years	37.9%
	35-44 years	8.8%
	45-54 years	4.4%

		Percent
	55 or Older	5.5%
	Total	**100%**
Gender	Male	22.5
	Female	77.5
	Total	**100%**
Educational Level	PhD	1.1%
	Master	1.6%
	Bachelor	59.8%
	High school Diploma	9.3%
	Intermediary level	24.2%
	Primary level	3.8%
	Total	**100%**
Marital Status	Single	71.4%
	Married	28.0%
	Other	0.5%
	Total	100%
Social media Platform used	WhatsApp	10.44 %
	Snapchat	5.5 %
	Instagram	30.22 %
	Twitter	43.4 %
	Facebook	10.44%
	Total	**100%**

4.2 Measurements

Table 2: Reliability and construct validity

Constructs	Cronbach Alpha
Social Currency (SC)	0.735
Emotional Connection (EC)	0.727
Practical Value (PV)	0.722
Brand Awareness (BA)	0.745

To test the instrument's reliability and stability, internal consistency using Cronbach's alpha coefficient was used to evaluate first 50 pilot observations than 282 observations. The obtained result was above 0.7 (Tavakol & Dennick, 2011). Table II shows that scales had a good composite. All variables have Cronbach's alpha values ranging between 0.722 and 0.735, which indicates their usefulness for analysis. The reliability coefficient for all components of brand awareness is 0.745, and the reliability coefficients of the viral marketing variables in this study concur with the minimum acceptable score of 0.722 (See Table. 2).

Furthermore, the to measure the degree of correlation between the independent variables, therefore evaluating the level of multicollinearity within the multiple regression model, a Variance Inflation Factor test (VIF) has been carried out (Salmerón, et al, 2018). To be considered the VIF values must not exceed 10, for risk of being regarded as signifying multicollinearity, furthermore the VIF tolerance should be greater than 0.05 (Salmerón, et al, 2018). A summary of the VIF and multicollinearity test results is presented in Table III; the obtained results of VIF values for all variables have scored in less than 10 and are within a range of 1.380 to 1.862. Moreover, the resulted variance tolerance values for all variables are shown to be higher than 0.05 and are within a range of 0.537 to 0.725. Hence, it is with statistical evidence that we can stipulate that there is no occurrence of multicollinearity due to a lack of high correlation amongst the research variables. Additionally, this signifies that there is no substantial correlation between the variables and supports their usage in the multiple regression model (See. Table III).

Table 3: Variance Inflation Factor (VIF) test

Variables	Variance Tolerance	Variance Inflation Factor (VIF)
Social Currency	0.725	1.380
Emotional Connection	0.544	1.839
Practical Value	0.537	1.862
Dependent Variable: Brand Recognition		

5. Data analysis and results

5.1 Descriptive analysis

Descriptive analysis of the data collected on the viral marketing dimensions and their impact on customers brand awareness across GCC are presented below. In addition to the empirical indicators for the three components of viral marketing: Social currency, Emotional connection and Practical value, we have also measured the quality of correlation between these three variables and the brand awareness. The potential correlation between the research variables and the multiple regression model will be discussed in the subsequent section.

In terms of social currency, the obtained results show that the majority of the respondents either agree or strongly agree that they prefer to share brand content that gives a positive impression and help them create a unique image about them with percentages of 35.2% and 33.0% respectively and a Mean = 3.934 and a Std.D = 0.961. Besides, around 39.6% are neutral about vising places that have been promoted through social media while 36.8 % agree that they often visit places that are frequently posted and shared on social media, the resulted Mean = 3.577 and Std.D = 0.887. Similarly, with regard to co-creating content and sharing post with social networks about 31.3% stated that they prefer to create and share posts about brands that give an impression of exclusivity and uniqueness, while 33% were neutral (Mean = 3.418 while the Std.D = 1.047). Moreover, around 40.1 % of respondents agree that they are more likely to be interested in products and services that are popular on social media with a Mean = 3.555 and Std.D = 0.943. Regarding their inclination to share posts and brand content, 44 % of the respondents agree that they are more interested to share posts that are creative, unique and really represent their desired perceived image with a Mean =4.017 and Std.D = 0.901.

The results for Emotional connection showed that 42.3% of respondents agree that they often share content that triggers positive emotions (Mean = 4.039 and Std.D = 0.875). Moreover, about 45.6% agree that they are more interested in products and services noticed on social media that trigger positive feelings and excitements (Mean = 4.060 with a Std.D = 0.835). Furthermore, 63.7% of the respondents agree that they are more likely to share content that surprise and impress them with a Mean = 3.764 and Std.D 0.988.

The results related to the practical value variable show that 40.7% of the respondents agree that they often share content that are useful to them, to their friends and family, to other persons in their social networks (Mean= 81% and Std.D = 0.877). Furthermore, around 42.3% strongly agree that they are interested in products and services that help them save time and money (Std.D value = 0,952) 74% indicate that they are more inclined to visit places that are practical rather than aesthetic (Std.D = 0.989).

5.2 Hypothesis testing

To measure the strength and direction of the linear relationship between the variables of the model, Pearson's Correlation statistical test and Multiple regression model were used. Regarding the correlation, (Ly, et al., 2018)stated that variables are correlated if the r value lies between -1 and 1. The value of 0 shows no association between the variables, while a value greater that 0 shows positive association between the variables; when one variable increases so does the other, and vice versa (Ly, et al., 2018).

The results of the correlation test are tabulated in Table 4, which shows details of the obtained coefficients for each component of the Model.

Table 4: Correlation analysis

		Social Currency	Emotional Connection	Practical Value
Social Currency	Pearson Correlation	1		
	Sig.			
Emotional Connection	Pearson Correlation	0.472**	1	
	Sig.	0.000		
Practical Value	Pearson Correlation	0.482**	0.651**	1
	Sig.	0.000	0.000	

**. Correlation is significant at 0.01 level (2-tailed).

The correlation Table IV indicates the existence of a positive correlation between the variables with scores within the accepted ranges and above 0.00. This confirms that all the elements of the viral marketing construct are consistently (positively) statistically related to subsequent brand awareness and recognition. In fact, the results of Pearson's Correlation test between between Social Currency and Emotional Connection show that there is a high positive correlation at a rate of r = .472, with a significance level of 0.000. Regarding the specific relation between between Social Currency and Practical value, the obtained results show that there is a moderate positive correlation at a rate of r = . 0.482, with a significance level of 0.000 which means that the Social Currency elements moderately positively correlates with Practical value. The obtained measurements of Pearson's Correlation test for factors having to do with Emotional connection indicated a high positive correlation of this variables with and Practical Value component with an r value of 0. 652 and a significance level of 0.000.

Table. 5 illustrations the results of the multiple regression model as conducted for this study, it shows both the T-value and P-value for the adopted independent variables.

Table 5: Multiple regression model results and hypothesis testing

Hypothesis	Variables	T-value (*)	P-value (**)	Decision
H1: Social Currency has a significant impact on Brand Awareness.	Social Currency (SC)	4.449	0.000	Accepted
H2: Emotional connection has a significant impact on Brand Awareness.	Emotional Connection (EC)	2.451	0.020	Accepted
H3: Practical Value had a significant impact on Brand Awareness.	Practical Value (PV)	1.960	0.050	Accepted
Dependent Variable: Brand Recognition (BR).				

(*) Significance at 1.96 level (T ≥ 1.96); (**) Significance at 0.05 level ($p \leq 0.05$).

Table. 5 shows that the resulted T-values for our research variables (SC =4.449; EC = 2.451 and PV = 1.960) are all higher or equal to 1.96. Therefore, it can be stated that there is a significant relationship between the viral marketing variables (SC, EC and PV) and the brand awareness construct (BR). Additionally, the resulted P-values of the three viral marketing variables are lower or equal to ≤ 0.05 which indicates a strong significant relationship between viral marketing variables and brand awareness as well as signifies that all three formulated hypothesis (H2, H3 and H4) are accepted.

6. Conclusion

As mentioned earlier, most of the studies about viral marketing have been tackling the concept from the perspective of large organizations and provide an extensive description of the viral strategies and its constituents. However, these studies do not provide many details about how these trendy marketing practices could be implemented successful in the SMEs context. This research provides a qualitative (theoretical) and quantitative (empirical) contributions in defining the viral marketing using social media and measuring the relation of its constituents with the brand awareness for SMEs in the GCC context. From a theoretical perspective, it bridges significant research gaps concerning patterns of viral marketing practices and their resulting promotional and commercial outcomes for particular companies' category and in a particular territory. In fact, an in-depth analysis of the current literature demonstrates that the concept of viral marketing has linked a variety of traditional and novel marketing concepts and practices all trying to explain the motives and behavior of costumer on social media related to a particular viral content for a given brand.

The viral marketing concept has proven to be efficient in explaining how technological and marketing elements interact together in a dynamic way to offer new business prospects for SMEs and large companies to grow, sustain and thrive. Additionally, this concept has shifted the unit of analysis of consumer behavior from the "individual" level to the entire social network system where the customer is actively engaged and impacted by other users is his social online network (Larson, 2009) (Watanabe, et al., 2021). Therefore, it's important to view and analyze the customers' behavior from a wider perspective that includes all the social networks related factors in a dynamic and evolving manner.

To conclude, this paper aimed to unveil the dynamics of the viral marketing strategies in the GCC context. This research demonstrated that appropriate viral marketing campaigns enables small, medium and large businesses to achieve higher brand awareness and thereby better financial performance. Besides, this study established a

comprehensive framework based on qualitative and quantitative data that clarifies the relationship between viral marketing factors (social currency, emotional connection and practical value) and brand awareness.

7. Limitations and future scope

Our research analysis is based on a small sample (only 282 observations) in one specific region (GCC region). To arrive at more robust findings, this analysis should be repeated in other regions (for example Middle East, North Africa or Asian countries, etc.) for multiple company's clusters (startups, small, medium and large companies) and for specific social media platforms (YouTube, Facebook, Instagram, Twitter, or LinkedIn). This would also allow for feedback effects of the viral marketing strategies output on the brand awareness and customers loyalty. The analyses should also be repeated by considering other factors such as behavioral, social, cultural and technological factors, potentially revealing different relations between the viral marketing strategy and brand awareness. We also noticed that while the conceptual definitions of constructs and elements to be generalizable to most SMEs, availability of data and empirical indicators may require specific measures of viral content. Some of the measures of virality in GCC regions may not be the same in other regions. Hence, at the level of analysis, researchers will need to identify and further examine the interplay of additional factors with the viral strategy outcomes. Likewise, future studies may also include across borders analysis by comparing between different viral marketing practices in different region and assessing their contribution towards raising brand awareness and positively impacting consumer behavior.

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Mixed Embeddedness of South American-Diaspora Ethnic Entrepreneurs in Japan

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Abstract: This research uses the theoretical lens of transnational mixed embeddedness (Bagwell, 2018) to provide an analysis of the institutional embeddedness of South American Ethnic Entrepreneurs (SADEE) in Oizumi Town, Gunma Prefecture. Taking a social-constructive approach, in-depth narrative interviews were combined with document analysis to understand how and to what extent these entrepreneurs become institutionally embedded in life in Japan. Findings of this study will help to inform local policy makers when developing frameworks and systems to support new types of ethnic entrepreneurship. An ethnic business typically starts when an entrepreneur begins serving other members of the ethnic community and satisfies their specific ethnic needs (Greene and Owen, 1992). No better can this be seen than in Japan. Ninety-seven percent of the population of Japan are Japanese, with the remaining 2% classed as 'foreign nationals.' Within the 2%, there are a number of residents who have some form of Japanese ethnicity. Specifically, there are significant communities of Brazilians and Peruvians in Japan. Foreign people with Japanese ethnicity are known as *Nikkei* and many of them emigrate to Japan for work. Some of these *dekasegi* (in Portuguese, meaning '*working away from home'*) have gained Japanese citizenship or taken advantage of special visas afforded to them to be able to settle in Japan. Many of the Brazilian diaspora have turned to self-employment as a means of upward economic mobility. This study illustrates what institutional embeddedness indicators have impacted upon the SADEEs journey as entrepreneurs in a foreign country.

Keywords: ethnic entrepreneurship, diaspora entrepreneurship, mixed-embeddedness, Japan

1. Introduction

Using the theoretical lens of Transnational Mixed Embeddedness*,* this research explores the factors influencing the experiences of South American Diaspora Ethnic Entrepreneurs (SADEEs) in Japan, specifically in Gunma Prefecture. Over the past ten years Japanese researchers have begun to explore the integration of the Latin American population into Gunma Prefecture. Kajita et al. (2005), was one of the leading researchers on Japanese Brazilians who coined a term for emigration from Brazil to Japan as *dekasegi*. Kato (2019) focused on life histories of South Americans of Japanese descent who have lived or spent their school years in Oizumi, Gunma Prefecture. The purpose of her study was to present the lived experiences of the first and second generations of Japanese South Americans, who she sees as the pioneers of foreign workers in Japan. Kato's study found that the actual living conditions differed depending on the age and type of school that the immigrants attended and formed the basis of recommendations that host societies should consider which would enable Japanese to coexist with multiple generations of foreign residents.

One of Kato's key recommendations was to consider the impact of education on these populations. Although there are individual differences in terms of occupation and Japanese language ability, the first generation has one thing in common: they affirm the town they live in as having a living environment where they can maintain their identity as a native. On the other hand, the second generation who attended public schools were aware of their identity from their parents and nationality but made career choices and decisions independent of ethnic factors and were able to assimilate into Japan, this was similar to findings of research by Tsunogae (2015) and Kakugae (2015). Other studies have found that the second generation has upward mobility conditioned by their Brazilian-ness (Nishida, 2018).

To summarize, previous research has focused on education and cultural adaptation, yet what is unique in our study is the exploration of to what extent SADEE are institutionally embedded through their decision to be entrepreneurs. It forms a small part of an overall study into the lived experiences of SADEE entrepreneurs across Japan. This paper begins by outlining the research on transnational entrepreneurship, before introducing the Japanese context and finally presenting the findings of in-depth interviews with various stakeholders.

2. Literature review

The following section will provide an explanation of the literature surrounding transnational entrepreneurship, particularly as it relates to diaspora entrepreneurship.

2.1 Transnational entrepreneurship

This study is concerned with the concept of Transnational Entrepreneurship (TE). Transnational Entrepreneurs "are individuals who migrate from one country to another, concurrently maintaining business-related linkages with their former country of origin, and currently adopted countries and communities. By traveling both physically and virtually, … (they) simultaneously engage in two or more socially embedded environments, allowing them to maintain critical global relations that enhance their ability to creatively, dynamically, and logistically maximize their resource base" (Drori et al., 2009, 1001).

2.1.1 Diaspora entrepreneurship

Diaspora entrepreneurs are part of Transnational Entrepreneurship as they are positioned to recognize new opportunities in their new host countries and exploit opportunities for business growth. They can contribute to job creation and economic growth not online in the host country but in their home country, socially and professionally via networking and collaboration opportunities, and financially via remittances and investment into their homelands. The mixed-embeddedness of diaspora entrepreneurs (Kloosterman et.al., 1999) means that they have very diversified networks and levels of embeddedness within both the host country and their country of origin.

2.1.2 Ethnic entrepreneurship

Within the domain of diaspora entrepreneurship is Ethnic Entrepreneurship (EE). As Green and Owen, (2004) ascertain, an "ethnic business typically starts when an entrepreneur begins serving other members of the ethnic community and satisfies their specific ethnic needs." Ethnic entrepreneurs are typically characterized by "low barriers of entry in terms of required capital and educational qualifications, small-scale production, high labour-intensity and low added value" (Green and Owen, 2004). Much competition can be found in amongst these communities and this has led to the emergence of a large number of start-ups and, in turn, a high rate of failure.

This research draws on the concept of enclave theory to understand these businesses as the theory suggests that often the demand for specific ethnic goods and services can only be fulfilled by those in the community (Portes, 1995). Enclave markets are strengthened by the residential concentration of specific ethnic groups as they provide a strong customer base. Thus, the enclaves and often the businesses within them are characterized by a concentration of co-ethnicity, co-social networks within a specific area which make the area self-sustaining (Zhou, 2010).

3. Theoretical framework

This research uses the theoretical lens of Transnational Mixed Embeddedness (Bagwell, 2018) and through combining different levels of analysis (embeddedness in the context; embeddedness in social networks; individual characteristics) we can expand the focus from the country of residence to the country of origin and the countries where the diaspora has settled.

As Granovetter (1995) points out, economic transactions are impacted by various social constructs which shape their forms and outcomes. Non-economic and institutional factors are often determinants of entrepreneurship. There are 'relational' and 'structural' types of embeddedness. Structural referring to the wider environment and political and economic structures around the entrepreneur and relational relating to the role of personal relationships between actors, in terms of culture, reciprocity and social engagement.

Within the framework of embeddedness, this paper specifically focuses on Institutional Embeddedness (IE). This recognizes that, according to Razin (2002), the opportunities which are offered by the environment of the host society have a strong impact on whether or not the immigrants turn to self-employment as a method towards gaining upward economic mobility. Specific aspects of the local host economy, such as political structures and legal-institutional factors directly impact upon the creation of small ethnic businesses.

4. Methods

The research approach rests on the assumption that migrants' entrepreneurial activities are influenced by a) the structure (laws, rules, market characteristics, etc.) of the places where they live and conduct their business (institutional embeddedness); b) their social network - the contacts they have (social embeddedness); and c) their human capital (skills and experiences). Although the wider research project addresses all aspects of embeddedness, this paper will focus on the findings related to institutional embeddedness of the SADEE in Oizumi Town, Gunma Prefecture.

In terms of institutional embeddedness the fundamental research questions are:

- a). What are the barriers of entry and government regulations faced by SADEEs?
- b). What are the market characteristics facing SADEEs in Oizumi Town?
- c). What support do SADEEs in Oizumi Town receive from local government?

4.1 Ethnographic fieldwork and document analysis

As social-constructivists working within an interpretive paradigm, we took a case method, qualitative approach to analyze the narratives produced by the SADEEs. Field research was conducted in Gunma, Japan between 10th-12th March 2021. Visits were made to local Peruvian and Brazilian businesses, four in-depth, narrative interviews were conducted with entrepreneurs and two interviews were conducted with government officials who support the non-Japanese communities (Table 1). Particularly in the case of the entrepreneurs, we recognize that narratives can help us to explore how individuals view their environments (Wrzesniewski, & Landau, 2007). Interviews and documents were transcribed and coded followed grounded theory protocol (as outlined by Glaser and Strauss, 1967; Strauss and Corbin, 1990). Open coding was the first step of analysis to find categories from the data.

Table 1: Fieldwork interviews and site visits in Oizumi, Gunma.

Case A	Case B	Case C	Case D	Site Visit
Peruvian, Male, 50's Restaurant Owner	Brazilian, Female, 30's Online Import Fashion Business	Brazilian, Female, 30's Esthetic salon owner	Brazilian, Female, 50's Samba group owner / former restaurant owner	Brazilian-owned steak house
Site Visit	Site Visit	Site Visit	Site Visit + Interview	Site Visit + Interview
Two Brazilian-owned supermarkets	Brazilian-owned esthetic salon	Brazilian-owned bread shop	Oizumi Town Tourism Division and Foreign Support Center	Oizumi Town City Office, Department of Intercultural Cooperation and Planning

Secondly, axial coding allowed us to relate categories to subcategories, allowing us to make connections. In the third stage, selective coding, we coded systematically for the categories that help to make a coherent framework (Strauss and Corbin, 1998).

5. Case context

This section provides an overview of the case context highlighting the geographical aspects of the Brazilian cluster town where the EE are based.

5.1 Gunma Prefecture Oizumi Town

Oizumi Town is located in Gunma Prefecture, Japan and has a population of approximately 40,000. It has the highest concentration of immigrants from South America in Japan, thus, it provides a strong bounded case study for the exploration of ethnic entrepreneurship. The town is 18.03km squared and 20% of the population are Japanese Brazilians. It is estimated that 15% of the population speak Portuguese as their first language. It has a strong industrial economy and is the home of many large Japanese manufacturing companies such as *Ajinomoto,*

Sanyo, and *Fuji* Heavy Industries. Since the 1980s, Oizumi Town in Gunma Prefecture has been facing a serious labor shortage problem in the manufacturing industry and immigration has somewhat eased this issue. The Mayor of Gunma Prefecture, executives of large Japanese companies and local civil servants working for Oizumi Town worked collaboratively to welcome immigrants from South America to live and work in Gunma. The South American immigrants can be categorized as *Issei, Nisei, and Sansei. Issei* refers to the first generation, these are individuals who came to Japan for the purpose of *dekasegi.* The term *Nisei* refers to the children of the first generation, while *Sansei* refers to their children. The first generation is divided into two groups, those that came to Japan before 1990 and those that came during the period of settlement after 1990. The second generation is based on the year 1997, when the earliest Brazilian school was established, and the third generation reached school age after 1997. The ethnic entrepreneurs in this study are first- and second-generation immigrants. Since the arrival of the immigrants, two international Brazilian schools have opened and numerous ethnic businesses.

5.2 Ethnic businesses in Oizumi Town

As the foreign population of Oizumi Town increased, as is common in ethnic enclaves, so did the number of ethnic businesses. Oizumi Town is estimated host to 112 ethnic businesses run by South Americans of Japanese descent (Kato, 2019). Ethnic businesses are characterized by being owned by people from different countries and the stores have foreign residents of the same country as their main customers. In Oizumi, Portuguese is the primary language used in the ethnic businesses however, signs in Portuguese can also be seen in non-ethnic stores, other commercial facilities, train stations and around the neighbourhood. Although most of the signage of the ethic businesses is in Portuguese, some of the stores have Japanese signage for Japanese tourists or local residents. There are larger ethnic stores and supermarkets which sell food and clothing as well as businesses offering community services such as beauty salons, car dealerships, garages and ethnic restaurants. The non-ethnic supermarket in Oizumi has also started to provide direct competition to the ethnic owned businesses with the stores holding some products from Brazil and Peru. The number of foreign customers started to increase around 2017 (Kato, 2019) and by 2018, foreign customers accounted for 10-15% of daily sales. As a result, it is possible for the non-Japanese community in Oizumi Town to lead a life similar to that of one's home country in Japan (Yamamoto, 2016).

6. Findings

6.1 Political-Institutional conditions

It is important to ascertain what barriers SADEEs face and to what extent were they supported by the government. This section will share findings on the political and institutional conditions surrounding the SADEEs in Oizumi Town, specifically a). the immigration laws, b). support for start-ups, and c). life and welfare support provided by local authorities.

6.1.1 Immigration laws

As this study is concerned with diaspora entrepreneurs, it is important to understand Japanese immigration law. The Japanese population is both aging and shrinking. The nation’s population of roughly 127 million is expected to contract by about 30% by 2065, when 38% of Japanese will be aged 65 and older, thus, migration is an important demographic issue. The Japanese government have made significant changes to their immigration laws in the past 40 years to address these issues. The main immigration law development was the 2nd reform of the Immigration Control and Refugee Recognition Act ICRRA (enforced in 1990) which allowed for the new creation of working visas specifically for foreign-born individuals of Japanese descent,

Recent data on the foreign-born population in Japan states there are 2.6 million foreign residents, making up 2% of the population. Fifty-two percent are women with the main countries of birth being China, Korea, and Vietnam. Japan has seen a growth of 19% in foreign residents since 2007 (OECD, 2021). Recently, Japan has created an Immigration Services Agency within the Ministry of Justice (MOJ) which has oversight on the technical training immigration system and new Specified Skilled Worker system. In addition to these new systems, several Japanese National Strategic Special Zones (NSSZs) have been designated as spaces to support and sponsor foreign-born entrepreneurs. These entrepreneurs will receive a six-month business manager permit to start their business and support from local incubators in one of the NSSZs.

The revision to the law in 1990 had an enormous impact on the influx of South American immigrants to Japan. Although the act allowed foreign nationals who were highly skilled to enter Japan, there was also a clause which allowed individuals who had family connections to receive visas and as such, a number of unskilled workers from South America also arrived. These individuals are termed *nikkeijin* and were immigrants from South America who had Japanese heritage. They were allowed entry for 'cultural understanding' and were expected to work in factories to support the labor needs of Japan while also connecting with their heritage. The *nikkeijin* population quickly grew throughout the 1990s and early 2000s, peaking at about 375,000 in 2007, or close to 20% of Japan's foreign population There were various push and pull factors which brought these individuals to Japan, including the abundance of manual work available in automotive companies, high levels of inflation in Latin America, improved safety and security in Japan and the opportunity to send remittances home. These individuals became known as *teijusha* – long term residents. They tended to be single men who came with the intention to work in factories and earn money which they would remit home but as time went on and the *nikkeijin* adapted to Japanese life, many decided to leave at the end of their visa but return on similar visas or would upgrade their visa to Permanent Resident status. They would also bring their family to Japan and stay indefinitely. It is these individuals, their spouses and children, who become EEs as they have formed settled, clustered, ethic communities in Oizumi Town.

6.1.2 Business start-up support

As stated in the previous section, once a member of the South American diaspora enters Japan, they are able to work in a variety of fields and can set up their own business. The procedures for setting up a sole proprietorship in Japan are relatively straight forward. Therefore, the first barrier to overcome for SADEEs is to complete the relevant paperwork. Although the forms are in Japanese, examples of how to fill them in are available in various languages online. In addition, if an SADEE has a strong social network on the ground they can use their ethnic community contacts to provide guidance and support. It doesn't appear that the local government provides these documents in Portuguese but once a business is set up, the owner is welcome to become part of the local business community but again, will need Japanese proficiency to be able to take advantage of the services available.

Prefectural Start-Up Support

The Gunma Prefectural government provides financial and practical support for businesses wishing to set up in Gunma Prefecture. The prefecture has created a social network around Facebook called "*Yaruki*." If the SADEEs are proficient in Japanese, this is a good way to connect with businesses throughout the prefecture. In addition, information about seminars and workshops for business development are also advertised through this channel.

The prefecture also launched an *Entrepreneurship Support Fund*. The fund was available to anyone wishing to start a new business in Gunma, with the aim of solving regional issues such as regional revitalization, community development, depopulation, support for the elderly, women and education. One of the regional issues outlined was providing "support for the acceptance of foreigners and multicultural conviviality" (Gunma Prefectural Government, 2021). Thus, an ethnic enterprise would qualify for this kind of funding, but as the funds are advertised only in Japanese there is a risk that that SADEEs may miss the opportunity to apply. The applicant must register as a sole proprietor or establish a corporation in Gunma on or after April 2009. An entrepreneur could receive up to 2 million yen.

Local Start-Up Support

Oizumi Town has the *Oizumi Society for Commerce and Industry* which is the key organization supporting the development of small and medium sized businesses in the town. They provide various support structures such as regular meetings, workshops, seminars, a monthly newsletter called "*Shrube*" and a local guidemap to all the small and medium sized businesses in the town. The society also focuses on youth entrepreneurs and female entrepreneurs, having two support groups specific to their needs.

The town also provides a subsidy for businesses that want to revitalize the town. The Green Road Shopping District in the town was home to many thriving ethnic businesses but due to the Lehman Shock and current COVID crisis, many businesses have been forced to closed. The revitalization project intends to eliminate vacant stores on the road and promote their effective use so they can contribute to the healthy development of

commerce in Oizumi Town and revitalization of the local economy. The subsidy rate is up to one-third of eligible expenses with a maximum subsidy of 20,000 yen per month for up to six months. Again, this would be a valuable resource for the SADEEs yet the application procedures are only available in Japanese, meaning the SADEE would need language proficiency or have someone in their social or professional network to assist.

6.1.3 Life support from local authorities

The local authorities in Oizumi Town have had to develop a number of social welfare services to support the SADEEs.

Language Support

Oizumi Town uses Portuguese as a primary means of supporting the Brazilian population. All necessary government paperwork for daily life is available bilingually, such as information about how to rent apartments, tax a car, recycle bicycles, fitness classes and medical facilities which offer bilingual medical attention. There are also point and speak communication tools used for complex interactions at the town office such as when dealing with taxes. In addition, Japanese language classes are offered free of charge to non-Japanese residents via the Multicultural Community Center.

Newsletters

A monthly newsletter titled GARAPA is available for all Brazilian residents and this provides key information about government matters, social events, financial issues and other welfare services.

Multilingual Disaster and Accident Manuals

As Japan is a country prone to natural disasters, all disaster manuals are procedures have been prepared in Portuguese and staff at the town office are available to support bilingually in times of disaster. Similarly, workplace accident manuals and procedures for claiming lability, compensation, etc. are available in Portuguese.

Child Welfare Support

All procedures regarding education and child welfare are explained in leaflets and on websites in Portuguese. Additionally, the tow provides a Japanese Language Assistant (JLT) in all elementary and junior high schools and there are future employment explanation sessions and career development workshops targeted at *nikkei* students.

6.2 Economic and market conditions

This section will highlight the key economic and market conditions faced by SADEEs in Oizumi Town, specifically the Lehman Shock, and the influence of COVID-19.

6.2.1 The Lehman Shock

The Lehman Shock in 2008 led to the temporary layoff of about 80% of the Nikkei population. As the number of Brazilians of Japanese descent dropped from 320,000 to 160,000, many residents left Oizumi Town. As a result, there was an increase in the number of foreigners on welfare in Japan in general. There are four types of resident statuses eligible for public assistance: permanent residents, spouses of Japanese nationals, spouses of permanent residents, and permanent residents.

In Oizumi Town at the end of October 2018, the total number of permanent residents, spouses, etc. of Japanese nationals, and permanent residents who were eligible to receive public assistance when they were in need was 5,830. In March 2018, the number of people living on welfare in Oizumi Town was 407, or 0.97% of the town's population that month. Of that number 94 were foreigners and 313 were Japanese In the same month, Japan's overall welfare rate on a headcount basis was 1.67% (Miwa, 2018). From this, we can calculate that the welfare rate on a headcount basis is 0.91% for Japanese and 1.24% for foreigners. This means that foreigners in Oizumi Town were 1.36 times more likely to be on welfare than Japanese residents. A further problem is that people who were in need were not eligible for public assistance. The number of foreigners who did not qualify

for welfare benefits in the town was estimated to be about 23% of the total foreign population. Primarily this includes technical intern trainees as when they lose their jobs, lose their source of income, and become uninsured, the question arises as to who will pay for their medical expenses in case of sudden illness or accident.

However, many Brazilians who stayed in Oizumi post-Lehman shock, actually returned to work and in opposition to the overall trend in Japan, the population of men and women who are at prime working age 40-45 is at a peak. It could be argued that this working-age population is supporting the elderly population of Oizumi Town; they are having more children, working, paying taxes and have shown recovery and resilience skills since the Lehman Shock. It is these kinds of immigrants who start their own ethnic enterprises. Rather than go on welfare, they seek out opportunities to use their skills to work for themselves. The Lehman Shock was certainly a push factor for many considering setting up an ethnic business.

6.2.2 The impact of COVID-19

Based on lessons learned during the Lehman Shock, improved intercultural communication has been the backbone of support during the current COVID-19 crisis. The Consul General of Brazil in Tokyo, Ms. Lima Neto, visited Oizumi Town in Gunma Prefecture on August 8, 2020 and exchanged opinions with leaders of the Brazilian community. It was confirmed that there was a need to strengthen the dissemination of information on the prevention of infection using SNS and other means (Asahi Newspaper, 2020).

The Mayor of Oizumi was quoted as saying that there was prejudice against foreign residents due to the spread of the disease and called for better support for the non-Japanese community. According to the prefectural government, about 80% of the 86 people whose infections were announced during the week of September 18-24 were foreign nationals, and about 70% of the 90 people whose infections were announced during the week of September 10-16 were foreign nationals. The majority of those infected were in Oizumi Town, Ota City, and Isesaki City, and were said to be mainly Brazilian and Peruvian nationals. The number of newly infected people is on a downward trend compared to September, but the percentage of foreign nationals is still high. Oizumi Town, where about 20% of the residents are foreign nationals, issued its own "emergency declaration" on September 18.

As well as experiencing discrimination (which had an impact on the number of patrons using ethnic businesses during the crisis), many foreigners also lost their jobs due to the economic downturn. To alleviate this problem, a facility was set up in Oizumi which temporarily shelters unemployed foreign workers in July 2020. The aim of the facility is to act as a safety net for foreigners and to help them rebuild their lives. The government worked in tandem with the President of the *National Network for Solidarity with Migrants* (based in Taito, Tokyo), a non-profit organization, with similar goals. There are 41 private rooms of about 6 tatami mats in a space of about 1200 square meters. It also has a cafeteria, shower room, laundry space and food provided by a food bank outside of the prefecture. The facility also has a room with computers and fax machines to encourage people to start their own businesses. Thus, it could be argued that the current crisis may similarly lead to more EEs starting their own business as a result of Corona cutoffs.

6.2.3 Remittances

Research on remittances from Japan is lacking but studies by Mistiaen (2005) suggest that at its peak, 2.2 billion USD were remitted to South America from Japan, annually. The *Nihon Rodo Kenkyu Kikoku* (Institute of Labor) estimated that the average monthly remittances from *dekasegi* workers was 1,644 USD in 1993 and 1,848 USD in 1998. The Inter-American Development Bank Microfinance International Corporation survey in 2005 found that 70% of South Americans remit regularly, on average around 14.5 times a year at approximately 600 USD a time, indicating around 8,700 USD are remitted annually. There are two major factors which have influenced the current flow of remittances, one is the Corona virus crisis as the immigrants find themselves in a difficult economic situation and have less disposable income to remit. Secondly, the number of immigrants bringing their families with them to Japan has also increased and as a result, the money is remaining in Japan. This has had a knock-on effect on remittance businesses themselves.

7. Discussion

This section will tie together the overall concepts that indicate the institutional embeddedness the SADEEs experience in Oizumi. Table 2 shows the political-institutional and economic and market conditions which shed light on the institutional embeddedness of SADEEs.

Table 2: Institutional embeddedness indicators

Institutional Embeddedness Indicators	
Political-Institutional	**Economic and Market Conditions**
Immigration & Visa Status Government developed a specific visa to address labour shortages Many SADEEs have taken advantage of the opportunity to upgrade visa status Visa status allows for dependent support Government worked with industry to address labour shortage **Business Start-up Support** Prefectural and local support is available for networking, funding and professional development, but is provided primarily in Japanese- linguistic barriers are apparent **Life Support** Welfare support provided in Portuguese Children are supported academically with language support until high school Diaspora networks provide emotional, social, and professional support.	**Lehman Shock** Many immigrants returned to their home countries Those who stayed turned to ethnic enterprises to make ends meet. Failings in the welfare support system were observed **COVID19** Lessons were learned from the Lehman Shock crisis Better support and welfare systems are in place Some regular workers lose their employment and become EEs Some SADEE diversify their business to cope with the crisis **Remittances** Remittance patterns have changed over the past 20 years, when the second and third generations become more acculturated in Japan it is likely remittances will decrease.

The research posed three research questions which will be addressed in this section.

a). What are the barriers of entry and government regulations faced by SADEEs?

The SADEEs do not experience barriers of entry in terms of visas however, they do face linguistic barriers as the documentation for starting a business is in Japanese. The linguistic barrier also makes interacting with local Japanese businesspeople problematic. As such it is not surprising that the EEs build their own social and business support networks to help each other integrate into Japanese business society. On the other hand, the increase in the number of non-Japanese business owners joining the local commerce association is a positive sign of increasing institutional embeddedness of SADEEs into Japan, putting them on a more equal footing with the Japanese business owners.

b). What are the market characteristics facing SADEEs in Oizumi Town?

The market has experienced extreme changes in the last 20 years. However, it is clear that lessons have been learned and the EEs have been able to change and adapt to the conditions. The local government has also provided more support during the current COVID crisis so it will have less of a detrimental effect compared to the Lehman Shock. The market conditions are somewhat positive compared to other areas of Gunma Prefecture, mainly because Oizumi Town has a relatively young population in comparison. If the younger generation can be supported to set up their own businesses or continue their family business and take advantage of revitalization support from the government, there may be many opportunities for the town and ethnic community to become even stronger. Similar to research on ethnic entrepreneurship, the market in Oizumi Town is typified by low barriers to entry in terms of requisite capital and educational qualifications, small-scale production, high labour-intensity and low added value whilst operating in a stiff competitive environment (Nwankwo, 2005).

c). What support do SADEEs in Oizumi Town receive from local government?

Oizumi Town could be considered a model town for the integration and social and welfare support of ethnic entrepreneurs. The level of support is high and barriers to entry are low. The town has a coordinated approach between the tourism, education and multicultural divisions, but there is still an opportunity to improve business

support, specifically in the use of Portuguese to aid communication between Japanese and non-Japanese business owners. There are many things the two groups of business owners could learn from each other and this seems a missed opportunity for integration and deeper embeddedness. One major issue to address is the generational shift among foreign residents in Oizumi. As these immigrants reach retirement age, they will need a different set of support and welfare services and this will be the next challenge for local and prefectural governments.

The mixed-embeddedness model assumes that opportunities must not be blocked by barriers which are too high or strict government regulations, that the opportunities are recognized by the entrepreneur him/herself and that the entrepreneur can take advantage of the opportunities offered in the community in a tangible way (Kloosterman, et.al. 1999) and this is what can be seen in Oizumi Town. The SADEEs and their businesses are both promoted and inhibited by the processes of institutional relations that include the social and business networks, political-economic, structures and dominant organisational and cultural practices (Yeung, 2002).

8. Conclusion

As many towns in Japan will experience an increase in foreign residents there is the likelihood that more ethnic businesses and communities will form. Our study found similarities with Nishida (2018) in that the second generation has upward mobility conditioned by their foreign-ness but we have illuminated this in an entrepreneurship context. We have filled the gap in the literature in Japan by presenting the institutional embeddedness indicators related to entrepreneurship.

Oizumi Town is an example of best practice of how SADEE can be institutionally embedded into the host culture. It is likely that foreign nationals will act as an employment adjustment valve in Japan and thus the long-term support of ethnic entrepreneurs and how they are embedded into society needs careful consideration. The local host economy needs to develop political structures and give further consideration to the legal-institutional factors impacting upon the creation of small ethnic businesses. Further research will expand on concepts of transnational mixed embeddedness with the aim of pushing the research and policy agenda forward.

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Trends in the Development of the Sustainability of a Shared Economy

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Abstract: More and more people today are asking why you own something you only need for a while. The original idea of a shared economy (SE) was really as simple as going back to the very roots of the economy. The owners will rent their unused resources and capacities, make money on them and the whole system will be a bit more efficient. Thanks to modern digital technologies that have minimized transaction costs, they have made everything cheaper, simpler, faster - and, importantly, made it possible to share on a previously unimaginable scale. The essence of SE is not only the sharing of things, but also the added value it brings. A shared thing is much more useful to the owner, the community, and society as a whole than the one that lies idle. Therefore, there is often talk of a completely new socio-economic system of material and human resources and their use. The key role is played by intermediaries who connect completely unknown people thanks to modern means of communication, usually in the form of Internet applications. It is their involvement and the extent to which they achieve that fundamentally distinguishes the shared economy from ordinary neighborhood bailouts. The main driving forces of SE are modern technologies. The fact that SE is significantly "greener" and greener also has a big impact on SE's popularity. With the advancement of ecological awareness, especially among the younger generation, their desire to consume as much as the older years decreases. However, according to surveys, sharing appeals to the majority of the population - four-fifths of respondents in a survey by the consulting company PwC said that they believe that SE makes life easier. The purpose of the study is the need to launch long-term regular SE research, at least at European level. The ongoing project "The Future of the Shared Economy in the Economic System" at the University of Finance and Administration in the Czech Republic responds to insufficient research on SE issues. The general rise in the cost of living (especially in large urban areas) will lead to an increasing need for more people to use different forms of sharing. From the intergenerational change, we will move on to a new understanding of economics (using the ideas of SE and CE - circular economics). These trend factors need to be addressed through the design of new business models. Awareness, awareness of personal influence on the functioning of society / planet / environment will have a primary influence on the way people behave. CE will gradually replace the linear economy. In the context of "evolutionary development", it is a matter of time before most companies adopt these ideas and ways of doing business. The survey showed that the willingness of Czech companies to share not only office space, but especially knowledge / know-how and skills. This is probably the most important finding. Sharing intangible assets.

Keywords: shared economy, digital technology, industrial revolution

1. Introduction

The aim of the presented paper is to show a possible direction in the field of sustainability of a shared economy, mainly on the basis of available literature and research. Despite defining the focus of a shared economy with an emphasis on current issues in sustainability, show the way for possible solutions in a circular economy. Humanity faces complex challenges that need to be addressed - climate change, the environment, unsustainable consumption, the level of inequality in the world, etc. The penetration of a shared economy into different sectors of human activity is often described as a prerequisite for further sustainable development. A shared economy is therefore one of the basic pillars of sustainable development, as it helps the market to function better, raises awareness of prices and the quality of services, but also gives everyone better access to the market. The most valuable asset of today's hectic times is for almost everyone. And in a shared economy, the biggest spell is saving it. You take care of your belongings during storage, moving, service, you pay for insurance, you are afraid of their theft. Renting is often cheaper. In addition to ecology, it can therefore be considered a key saving of time and money. Sharing is all the easier the faster online platforms are evolving, allowing us to search, connect platforms and owners with service providers. The issue of shared economy and related scientific issues has not yet been addressed. Related to this is a smaller amount of available relevant professional literature. The author's effort and motivation is to capture and systematically address the shared economy within his own academic competence.

The SE model is currently mostly implemented in B2C (business-to-consumer) markets, but resource sharing is still a problem in the business environment. In business-to-business (B2B) relationships, the use of economic sharing has a number of unresolved issues related to legislation, accountability and security. Under the influence of the global pandemic covid-19, it is worth thinking about and now it is not possible to predict exactly where

SE will develop. Due to the massive development, this could have a major impact, especially on producers of tangible goods, where their number can be significantly reduced. The reduction of this production output has an impact on the amount of sales, and thus on the overall economic results of companies. Based on the presented article, it can be stated that in order to maintain competition, these manufacturers must reconsider their strategies for the future and monitor the development of SE and respond to it (adapt). If it's the right way, time will tell. For example, according to a 2016 PwC study for the UK market, key sectors of the shared economy were expected to generate £ 140 billion to Britain in 2025. The five previously most important sectors of the shared economy - finance, housing, transport, small household services and professional services - could increase fivefold compared to 2015. Under the influence of the global pandemic covid-19, but everything will be different. Furthermore, it is necessary to deal with the comparison of the traditional distribution model with the distribution model based on distribution and the conclusions for the regulation of the shared economy. This article does not present precise and unambiguous conclusions, but points to the need to constantly address the development of a shared economy. This paper showed the need to monitor the development and trends in SE in a global environment.

SE affects the disruption of traditional industry, the so-called disruption. However, every significant innovation naturally brings about a change in established orders and, among other things, legal rules. Contrary to reality, pure ideas thus turned into pure capitalism. This development is related to the onset of a new industrial revolution, which is driven by the strengthening of automation and digitization of the broadest areas of social life and industry. If sharing started with the help of the neighborhood, we can look forward to a whole new concept of employees in the future, where companies will share human work in the online market in real time.

2. Literature review

If the content of the article should cover the topic "Trends in the sustainability of the shared economy", it should be noted that there is not yet a large amount of literature focused directly on this particular issue. It is therefore drawn from authors dealing with partial parts of the topic, especially R. Botsman and R. Rogers, P. Goudin and S. Ranchordás or from OECD reports. To meet the goal, the article made it a priority to present sustainability in a shared economy in relation to its generally presented ideas. A detailed overview of the used literature and authors is given at the end of the article.

3. Methodology, goal and purpose of research

Shared Economy (SE) is a current concept associated with the sharing of human, physical and intellectual resources. The penetration of a shared economy into different sectors of human activity is often referred to as a prerequisite for further sustainable development. A shared economy is therefore one of the basic pillars of sustainable development, as it helps the market to function better, raises awareness of prices and the quality of services, but also gives everyone better access to the market. It is necessary to monitor, research, analyze and focus on identifying positive and negative impacts. The speed of technological development has significantly exceeded the legislative, regulatory and tax frameworks, which is often the cause of tensions between old and new business models. In general, a balance between the degree of regulation and freedom is a desirable state of affairs that provides a clear framework and rules for SEs and allows for their further development and change. However, there is no consensus among experts on how to achieve this balance. The tightening of the regulation of individual shared services or, conversely, the deregulation of traditional industries is most often mentioned. At the same time, there are critical voices pointing out that the shared economy is the result of technological progress that cannot be suppressed or reversed by any regulation, so it should have its own special laws. Given the popularity and constant development of digital technologies, along with consumer habits, it is very realistic that a shared economy will sooner or later affect almost all areas of business. In order to make the most of its potential, it will be necessary to find a way to adapt to its development and influence it as needed. The paper deals with the above areas with a possible prediction and proposal of future development.

The stated goal of the paper was achieved by implementing the following scientific methods and organizational principles. For the purpose of the meeting, a survey of available relevant literature and studies dealing with the issue of SE was conducted. Furthermore, a meta-analysis was performed, which summarizes the data from several partial independent studies. The aim is to identify and quantify the prevailing trends or to determine the causes of different conclusions of the work. A questionnaire survey among business entities in the Czech Republic was conducted for a real mapping of the readiness of legal entities. A total of 2,000 companies in the

Czech Republic were contacted by e-mail by random selection (for companies from various fields). Data collection started on 12.4. 2021 and ended 30.4. 2021

Based on the evaluation of the obtained data, possible trends in the development and sustainability of the shared economy are determined. This article is a partial output of research conducted at the University of Finance and Administration. The name of the project is "The future of a shared economy in the economic system", where the main goal of the project is to determine the estimate of the future development of SE.

4. Shared economy and its models

A modern shared economy can generally be defined as favoring access to durable goods and factors of production through digital platforms without personal ownership of these assets. It is a free online market that helps to make more efficient use of currently free production factors with economic, environmental and social benefits (Blazek, 2020).

An important role in the model of a shared economy is played by Internet intermediaries, who in recent years have rapidly expanded their field of activity thanks to the ability to enable sharing with people who were hitherto distant and unknown (Schor, Fitzmaurice 2015). An important aspect is the creation of a certain social infrastructure and a "community marketplace" through which goods and services can be shared. An essential feature is the principle of belonging and solidarity (Bardhi, Eckhardt 2012). Celata and Hendrickson (2017) also emphasize the idea of social utility as one of the main aspects of a shared economy.

Many divisions of shared economy can be found that try to classify individual forms of sharing. Nevertheless, there is no stable division of the shared economy. Most divisions are based on various parameters. Here are two well-known models. The first split is from Rachel Botsman and Roo Rogers, who split the shared economy into three systems. And the second division, according to the author Lisa Gansky, which distinguishes two models based on ownership.

Botsman and Rogers (2011) divide the shared economy into three systems - the product services system, the redistribution markets, the collaboration lifestyle.

The basic idea of the product service system is that people lose the need to own goods and become interested only in its use. The number of these people in all age groups is still rising. This system can be characterized as services that allow the sharing of products owned by companies or individuals. Individual offers are linked to stakeholders mainly through web platforms. This approach simplifies the use of products, disrupts the traditional industry, which is based on personal ownership, and brings users two main benefits: The first advantage is that users only pay for use. Therefore, they do not have to cover the costs associated with owning the product (such as maintenance, repairs, insurance, etc.). The second advantage is the possibility of much higher satisfaction of human needs if the need to own products is relocated. This system brings a new dimension to the use of things. The customer does not own the product, and thus becomes much less dependent on a particular item. As a result, he can spend time worrying and caring for the product in more meaningful activities - such as traveling, realizing his visions and dreams, or spending free time with his family (Botsman and Rogers 2011).

Another system is redistributive markets. These are places where new or used goods are redistributed. These sites encourage the re-use and resale of old items - ie the transfer of goods from owners who no longer use it to stakeholders who need and continue to use it. These can be marketplaces based on the exchange of goods for money, various membership points or these goods are offered completely free of charge. A wide range of goods has been redistributed, such as accessories, clothing, books, toys, games, etc. It is also possible to exchange for similar goods or goods of similar value. Platforms such as Swap are used for this. Regardless of the type and specifics of the stock exchange, the redistribution market reduces waste and encourages the re-use and sale of second-hand items (Botsman and Rogers 2011).

The last system of common lifestyles is a little different from the previous ones. It is not about sharing physical goods, such as cars, bicycles or clothes. People with similar interests connect through platforms and share and exchange intangible assets such as time, space, experience, knowledge, skills or money. These exchanges can take place locally or remotely. It is about sharing work spaces, skills, time, parking spaces, accommodation spaces. The biggest motivation for users is saving or making money in product service systems and redistributive

markets. Unlike these two, the system of a common lifestyle has a completely different motivation, which is much more varied (eg comfort, making new friends, saving time or space). Another motivation may be the feeling that the customer is becoming part of the platform community (Botsman and Rogers 2011).

Unlike Botsnam, which divides the shared economy by type of sharing, Gansky distinguishes models based on ownership. It describes the characteristics of so-called "network" companies. The prosperity of these companies today is supported by the development of the Internet, wireless devices, mobile devices, technology and the rise of social media. In principle, these business networks are based on sharing rather than ownership itself. Companies in this network use the web, mobile devices and information networks. They focus on physical goods, materials and engage customers through social networks (Gansky 2010).

5. Development tendencies of a shared economy

Another concept that we may encounter in the context of the concepts of sharing and shared economy is the concept of a circular economy. According to Webster (2013), this is an economy based on renewables, an endless flow of energy from the sun and the transformation of materials into useful products and services. This approach transforms the function of resources in the economy (Preston, 2012). Factory waste is becoming a valuable input into other processes. The economics of circulation support the production of products through closed-loop material flows. Energy consumption is thus shared for optimal use. (Sauvé, Bernard and Sloan, 2016). An important factor in the context of the circular economy is the area of recycling. We can perceive it either in the traditional sense, ie as a process of material transformation of waste, but in a broader sense it also includes the trend of sharing.

The basic principle of the circular economy is very simple: to create systems that allow the value of the product to be maintained in the cycle for as long as possible. What seems simple at first glance is, in fact, a fundamental change in the business model. The development of SE takes place in the form of a circular economy. It captures the alternative idea of SE, which is mainly focused on product reuse. One of the main aspects is the ecology and economic use of materials. The concept of the circular economy is currently widely supported, especially in Asia, where it has its roots mainly in industrial ecology through a symbiosis between companies and production processes. Industrial ecology then emphasizes the benefits of recycling the remaining waste materials and the subsequent use of by-products (Andersen, 2007).

The circular economy is a new model of sustainable development that has the ability to overcome current environmental and resource management challenges. This increases resource productivity and environmental efficiency. The main pioneer in this area is China, which projects this idea into a closed loop of material flows in the Chinese economic system. By successfully implementing this model, China wants to successfully overcome the environmental damage caused in the past by the strong industrialization of industry and the economy (Geng, Doberstein 2008).

In a circular economy, the sale of goods is often replaced by rent, thus applying the principles of SE. Economic growth is not necessarily conditioned by the purchase of many products. Instead, we can buy services (Blažek, 2020).

6. Goods replacement

An important part of a shared economy is an area built on the exchange of goods between the various participants. In recent years, there has been increasing public and community interest, with various groups in the form of friends, universities and online communities organizing events to share these reusable assets (Rogers, Botsman 2010). Increased interest in sharing and exchanging goods is seen as a wave of social innovation that supports the idea of sustainability. The exchange, referred to as a "swap", focuses on the recycling of unwanted items, which can be used by another to serve another person and thus extend the life cycle of products (Schor, Fitzmaurice 2015).

7. Sustainable development and its aspects

We need to assess environmental and economic sustainability and accept their interconnectedness and interdependence.

Sustainability concerns:

- a) the use of the biosphere by present generations while maintaining its possible return to future generations; and / or
- b) declining trends in economic growth and development ”(OECD, 2001a).

In a sustainable economy, according to Daly and Farley (2004), it is necessary to maintain five quantitative factors - GDP as a measure of economic growth, "utility", performance, natural capital and total capital - the sum of natural and human capital produced. "Sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (OECD, 2001b) - in contrast to growth, which can be seen as a quantitative expansion of the economy, although almost neoclassical economics (Daly, Farley, 2004).

8. Consumption and the environment

The modern trend of consumption in developed countries is driven by the effort to buy and own everything we currently need (Kassan, Orsi, 2012). The process of converting materials and intermediates into final products is called production, while the final use and destruction of products is called consumption (Røpke, 2009). Therefore, every production involves the use of material resources. As stated by Alan Durning (1992), a high level of production has a huge impact on the environment. Production-related processes usually have a large number of harmful externalities.

The claim - in order to increase the environmental space to ensure a better standard of living for the poor, rich countries must reduce their own use of natural resources, thereby reducing the flow of waste, the question of living standards and consumption arises (Røpke, 2005). The main areas are energy, materials and ecosystems. In the approach to lifestyle, it is food, transportation, and the things we buy and use (Durning, 1992). Economy-sharing platforms touch on each of these categories.

From an ecological point of view, individual ownership may not be the most effective way to satisfy our needs, because goods are usually used only for part of their life cycle (Kassan, Orsi, 2012). The sharing economy enables the transition from asset ownership to shared access to assets (Bostman, Rogers, 2010, cited in Martin, 2016). SE also promotes reuse and recycling and can therefore reduce the potential use of resources and new waste (Stemler, 2016).

According to Daly and Farley (2004), as production and consumption growth slows, less is added to the system, and therefore the system can be maintained in the long run. We consider the shared economy and related technological improvements to be part of the development - a qualitative improvement that will enable the efficient use of free capacities without a quantitative increase in throughput.

This revolution in efficiency must be accompanied by changes in the sufficiency of the world's richest population (Røpke, 2005). A sustainable world should focus on purposefully improving the quality of life - trying to find satisfaction in things other than goods. These include interpersonal relationships and leisure, rather than the thoughtless expansion of the production, consumption, and inventory of physical material (Meadows, Randers, Meadows, 2004).

Rather, living a life with an emphasis on family, community, work, and life itself (Durning, 1992). The nature of service sharing is clearly linked to the idea of a revolution in the sufficiency of the green economy.

There are two conditions for reducing individual unsustainable consumption with the impact of a shared economy:

- 1. Exclude so-called "superusers". The definition of SE includes only people who provide and have access to overcapacity. In the case of superusers, people use economy sharing systems to run traditional businesses. These users create new capacities instead of using their others (Stemler, 2016),
- 2. The money saved on the services of a shared economy will not later be used to consume goods / activities, which in turn will lead to greater unsustainable development. (Goudin, 2016).

Based on Gregory Mankiw's standard definition of consumption (2009), we can say that SEs can reduce the consumption of unnecessary and durable goods, because instead of buying these goods individually, access is

shared and therefore consumption is limited. Users thus only pay the price of the asset access service and the total consumption is reduced.

9. Current state of knowledge of companies in the Czech Republic about the shared economy

With the help of the internal grant agency VSFS (University of Finance and Administration in the Czech Republic, Prague), a questionnaire survey was conducted among business entities in the Czech Republic within the project "The future of a shared economy in the economic system". The main researcher is the author of this article. This is the fulfillment of the partial goal "Current state of knowledge of companies in the Czech Republic about the shared economy". Due to the completion of the survey 30.4. 2021, only gross outputs are given here. A detailed analysis of the researched issues and a detailed search of world literature will be presented in the final report (book publication), which will be published in the Czech Republic at the turn of 2021/2022.

A total of 2,000 companies in the Czech Republic were sent by e-mail. Gradually from 12.4. to 30.4. 2021. A total of 134 respondents answered. The rate of return is 6.7%. We attribute this period to covid, when companies tend to solve existential problems and do not try to solve and respond to external issues that currently do not bring them anything.

10. An overview of the most important outputs from the survey:

- The term "Shared Economy" is known to 87.3% of respondents, ie 117 respondents.
- 43.3% of respondents, ie 58 companies, have experience with the shared economy in the company.

Awareness of a shared economy

Questionnaire - question	**the answer - yes (%)**
Do you know the concept of shared economy?	87,3
Do you have any experience with a shared economy in your company?	43,3
Does your company use the services of a shared economy?	47,8
Are you considering sharing in some areas in the future?	47
Do you think that the use of some form of shared economy supports the competitive advantage of the company?	71,6
Has the ongoing COVID-19 pandemic affected / affect your view of the shared economy?	28,4

In what industry does your company operate?

Scope of the company	**Percentage (%)**
Retail and consumer goods	12,7
Banking and financial services	11,9
Services	11,2
Manufacturing and production	11,2
Construction	6,7
Automotive industry	6
Telecommunications, entertainment and media	5,2
Real Estate	4,5
Transport and logistics	3,7
IT	3,7
Consulting	3,7
Public sector	3,7
Accounting, Audit	3,0
Energy, distribution networks and mining	2,2
Wholesale	2,2
Tourism	1,5
Insurance	1,5
Healthcare and pharmacy	1,5
not specified	3,7

Does your company use the services of a shared economy? *(possibility of more answers)*

Use of shared economy	Percentage (%)
Information and knowledge sharing	25,4
Space sharing	23,1
Means of transport	18,7
Employee sharing	16,4
Asset sharing	9,7
Catering capacity	6,7
Sharing research and development	6,0
Accommodation capacity sharing	4,5
Sharing financial services	3,7
Sharing of non - financial services	3,7
No	51,5

Are you considering sharing in any of these areas in the future? *(possibility of more answers)*

Areas	Percentage (%)
Space sharing	18,7
Employee sharing	14,9
Information and knowledge sharing	14,9
Means of transport	13,4
Asset sharing	11,9
Sharing research and development	7,5
Sharing financial services	5,2
Sharing of non - financial services	5,2
Accommodation capacity sharing	4,5
Catering capacity	3,0
No	53,7

What are the benefits / benefits for your business of each form of sharing? *(possibility of more answers)*

Advantages / benefits	Percentage (%)
Cost reduction	60,0
Resource efficiency	27,7
Information sharing	16,9
Earnings	4,6
The idea of a shared economy	4,6
Jednodušší řízení	1,5
Other	10,8
Nothing	9,2

What are the perceptions / risks to your business arising from each form of sharing?

Limitations / risks	Percentage (%)
No risks	29,1
Capacity and the possibility of overloading shared areas	11,9
Data and personal data leakage	11,2
Competition	9,7
Risk of abuse	7,5
Return on capital risk	5,2
Unlimited liability	4,5
Another answer	24,6
I do not use / I do not know / did not answer	14,2

Another research question was:

- "Have you considered working together, or have you ever worked with competitors to reduce your own costs?" 33.6% of respondents (45 respondents) have or have such an experience.

- "Has the ongoing Covid-19 pandemic affected the view of a shared economy?" 28.4% of respondents (38 respondents) stated that the ongoing pandemic affected their view of the shared economy.

How many employees does your company have?

Company size	Percentage (%)
less than 10 employees	46,3
10 - 50 employees	32,1
51 - 250 employees	6,7
more than 250 employees	14,9

What annual turnover does your company report?

Company turnover	Percentage (%)
less than 1 000 000 eur	54,5
1 000 001 - 5 000 000 eur	20,9
5 000 001 - 15 000 000 eur	9,0
more than 15 000 001 eur	15,7

Source - all tables: Blazek, L, own research - project "The future of a shared economy in the economic system", 2021

From the above, it can be summarized that the concept of SE is well known among companies in the Czech Republic, but less than half of companies want to use or are aware of the potential and benefits of SE. About half of the responses were received from companies with less than 10 employees and an annual turnover of less than EUR 1 million. For a detailed analysis of the development of SE and foreign comparison, it will be necessary to conduct a survey in the global environment of the world's advanced economies.

11. Conclusion

The research conducted among companies in the Czech Republic showed that entrepreneurs know and perceive the importance of SE. In most cases, however, they are unable to pinpoint and estimate whether the SE brings them certain benefits or limits them in further development. It is also possible to trace the fact that SE in connection with selected outsourced activities can bring companies a reduction (optimization) of costs.

The Covid period significantly dampened the "expected" development of SE, which, based on its research, was predicted by studies by large consulting firms (see PwC, Deloitte,…).

In the future - ideally after the disappearance of covid 19 - it will be necessary to repeat a similar extended questionnaire survey. The aim is to obtain a much higher number of completed / answered questionnaires and thus more accurately determine the readiness of companies for the development of SE.

Within the expected trends of localization of the economy and gaining benefits for local communities, the ideas and importance of SE can help to fulfill this. The key is technologies that enable global collaboration, sharing ideas, procedures, learning from each other and subsequent application in local production.

An important factor for the development of SE (and this does not appear in the questionnaire survey due to the focus only on companies) is the perception of this issue among the younger generation in the range of 18-25 years.

E.g. in the Czech Republic (and elsewhere in Europe) see we record a significant rise in real estate prices, which will affect the level of rents. And not only, for example, in the case of short-term rentals (Booking.com, AirBnb,…), but especially for ordinary housing of citizens.

One can recognize the trend - the willingness of young people not to own goods of diverse nature, but to borrow them. It should be noted that this may not be an internal conviction of this group, but it may be a question of costs and acquisition prices of necessary (or currently fashionable, used, but unnecessary) goods. Ownership of things, resp. "Need not" to own them can be an essential factor for overall sustainability, not just SE.

The main finding is in particular the need for regular research and development of SE in relation to the development of technology, the needs of citizens and the reactions of companies. The sustainability of the SE will continue through the development and strengthening of social innovation and the development of the circular economy. This helps to protect natural resources and protect nature. People lose the need to own goods and are only interested in using it. The redistribution of new or used goods reduces waste and encourages the re-use and sale of used goods. The SE also assists in the exchange of intangible assets in the form of exchanges of goods between participants. In addition, today's society is increasingly looking for ways to "escape" hectic lifestyles and stress, and it has been shown that the more things we have, the more often we feel in chaos and discomfort. In times of prosperity, as the environmental Kuznets curve shows, it is time to realize that for more money it is no longer possible to buy more goods, the acquisition of which would increase our happiness. Sharing resources can increase your company's resilience to crises and ensure its sustainable development.

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Eco-Marketing: Consumer Behaviour in PET Bottles Recycling

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Abstract: The study aims to identify the main issues a consumer faces in relation to PET bottle recycling and also to discuss more sustainable ways. A quantitative survey was conducted on a representative sample of 1000 respondents in the Czech Republic. Data are analysed in order to find the main features, correlations, strength, and others. Namely, crosstabs and cluster analysis were used, tested, and interpreted in statements. Thus, the background for consumer influencing was derived/achieved. The findings are: Sociodemographic characteristics of consumers willing to recycle PET bottles were defined. Motivation and willingness to recycle in the bottle deposit system were quantified. At the same time, the optimal deposit was identified. A group of consumers who are not willing to participate in the recycling process was defined, and their media behaviour was mapped for possible influencing. As to practical implications - this study concentrates on analysing consumers' willingness to join the PET recycle system, which should lead to an increase in the number of recycled PET bottles. The global effort is supposed to minimize the amount of PET bottles ending up in mixed waste or nature. This study also discusses the basis and approaches to achieve it. It can be considered as a direction for the sustainability leaders how to use marketing tools in order to ensure sustainable growth of plastic bottle recycling. This survey is original for its scope and focuses towards to be followed by marketing implication. It contributes to a better environment as it discovers the ways of applying Marketing and influencing the consumers.

Keywords: PET bottles recycling, consumer behaviour, willingness to recycle, Czech Republic

1. Introduction

The study focuses primarily on consumers' willingness to engage in a PET bottle deposit return scheme. It should serve as a tool to increase the percentage of recycled PET bottles and thereby reduce the percentage of PET bottles that end up in a normal waste or nature.

Eco-marketing can significantly help to protect the environment, specifically to encourage the recycling of PET bottles. In order for eco-marketing to be effectively implemented, it is necessary to analyse existing consumer behaviour and identify their motivation factors and their power. Furthermore, it is necessary to find segmentation criteria according to which it will be possible to create effective segmentation for targeted and optimal effects of eco-marketing.

This study provides eco-marketing with an important basis for influencing the population towards greater willingness to recycle PET bottles (in the form of the bottle deposit system and store returns).

The study aims to:

- Identify existing recycling behaviour
- Find out if a refundable deposit motivates
- Find out the incentive power of the bottle deposit system - find out the optimal amount of the deposit
- Identify the socio-demographic differences of respondents in their attitude to the amount of the deposit (the respondent's age was determined)
- Divide the respondents into segments according to their willingness to participate in the PET bottle deposit return system
- Identify the segment least willing to recycle PET bottles

2. Background

The study is based on a synthase of several aspects influencing the eco-behaviour of consumers. The overview presents them.

2.1 Environmental sustainability

Concerns about environmental development and sustainability of life on Earth are expressed by the UN. The UN Environment Programme UNEP (UNEP, 2019) states that approximately a third of the food produced ($ 1,3 billion tons worth $ 1 trillion) annually deteriorates either on the way to the consumer or is thrown away by the consumers themselves. Another example states that if all consumers replaced light sources with energy-saving bulbs, about $ 120 billion per year would be saved. 87% of Europeans are concerned about the environmental impact of plastics, and 74% are concerned about their health. People make an effort to solve the plastic problem (the European Strategy for Plastics in a Circular Economy, 2018).

2.2 Eco-marketing

Eco-marketing is a part of the modern marketing of companies (Cronin, 2011). The aim is to create a positive image of an environmentally friendly company and to avert potential boycotts by customers. Cronin also emphasizes that environmental elements often appear in evaluating the effectiveness of a company and therefore affect its value. “Green” behaviour also shows the financial strength and innovativeness of companies (Kassinis and Vafeas 2006; King and Lenox 2002; Klassen and Whybark 1999; Majumdar and Marcus 2001 in: Cronin et al, 2010).

Cronin states four key reasons for an eco-marketing strategy. These are purely economic reasons - saving material and energy costs; public pressure; companies themselves can increase demand due to environmental practices; the growing antipathy to globalization and the strengthening of NGOs in the field of environmental business behaviour (Kleindorfer et al. in: Cronin et al., 2010).

Developing more environmentally sustainable consumption and production systems depend upon consumers’ willingness to engage in "greener" consumption behaviours. The consumers’ willingness to accept behavioural change is based on the subjectively perceived value of the product, in which both economic, social, and psychological motives play a role. The emerging picture of green consumption is of a process that is strongly influenced by consumer values, norms, and habits, yet is highly complex, diverse, and context-dependent. (Peattie, 2010)

Public opinion is clearly ecologically oriented. Consumers are very much in favour of plastic recycling. The results published in the EC report in 2018 indicate that 94% of consumers think that products should be designed to facilitate recycling. 94% think that industry and retailers should reduce plastic packaging. 90% believe that local authorities should provide more plastic waste collection facilities. 89% think that people should be instructed on how to reduce their plastic waste (the European Strategy for Plastics in a Circular Economy, 2018).

However, there is a distinction between consumer opinion, which is most environmentally friendly, and their behaviour. In order to distinguish consumers who have the will to behave eco-logically from those who do not, the characteristics of the environmentally-friendly or green consumer are identified.

Peattie shows that the behaviour and attitudes of green consumers are influenced by the effects of culture as such (Anderson and Cunningham 1972; Mostafa 2007; Webster 1975 in: Peattie, 2010), personality (Kinnear et al. 1974), motivation (Yoon et al. 2006 in: Peattie, 2010) and socio-demographic characteristics (Shrum et al. 1995; Diamantopoulos et al. 2003; Tanner and Kast 2003 in: Peattie, 2010). It also shows that there is a big difference between the declared and the actual environmental behaviour of consumers. Respondents in the survey (Peattie, 2010) claim that they are ecological, but the eco-friendly products are still selling very little. Although most respondents say they be-have ecologically, green products make up less than four per cent of global market share (UNEP 2005 in: Peattie et al, 2010)

The results of a study by Gleim et al. (Gleim et al., 2019) suggest that important predictors of green behaviour are internal, that is, psychological factors such as interest, altruism, willingness. Research of external factors such as the influence of an organization, the media, and the government suggests that consumers face many external influences and are not sure whom to trust.

2.3 Problems of beverage containers

In 2006, 300 billion plastic beverage bottles were sold worldwide. In 2016 it was 480 billion and by 2021 it will be 583 billion a year, (Laville, Taylor, 2017). In terms of the collection of bottles after consumption, sorted waste bags showed the best results. This was followed by a deposit return system and sorted waste containers. Although refilling of bottles leads to a reduction in greenhouse gas emissions, it has become less significant after several reuses (Simon et al, 2016).

2.4 The situation in PET bottle recycling in the Czech Republic

The current situation in the recycling of PET bottles in the Czech Republic is addressed in an analysis of the Institute of Circular Economy (ZÁLOHUJME?, 2018).), which focuses on the segment of soft drinks, ciders, and alcoholic and non-alcoholic beer. PET bottles for oils, milk, or pharmacy products are not included in the analysis.

The Extended Producer Responsibility (ERP) system operates in most European countries. Since it relies only on the willingness and ability of consumers to separate waste, it achieves limited efficiency. Plastic waste yet needs to be re-sorted and only a minor part of it can be further recycled, (ZÁLOHUJME?, 2018).

According to the main results of the study ZÁLOHUJEME? around 56 202 tons of PET bottles (+/- 14,2 %) were placed on the market in the Czech Republic in 2016. Sorted plastic waste containers contained approximately 39 039 tons of PET bottles or 69,5 % of the total number placed on the market (+/- 3,9 %). The rest (30,5%) ended up in mixed municipal waste or was dropped. After re-sorting of PET bottles, only 31 400 tons (+/- 5 %), or 55,9 % out of the total number placed on the market, were sent for recycling and processed into flakes (as a secondary raw material of PET). The limitations of the current PET bottle recycling system in the Czech Republic according to the data of the study ZÁLOHUJEME?, based on data from EKOKOM operating most of the collection containers, have stagnated for a long time, and even the increase in the number of containers from 118 400 in 2016 to 144 500 in 2017 did not increase the percentage of returned PET bottles. Therefore, the PET bottle deposit return scheme is under consideration, (ZÁLOHUJEME? 2018)

There appear to be both advocates and opponents of the deposit system among beverage producers using PET bottles. Karlovarské minerální vody, a. s. is a promoter of the PET bottle deposit return scheme and contracting authority of the study ZÁLOHUJEME? The opponent of the PET bottle deposit return scheme is, for instance, Ondrášovka. The company argues that consumers are not sufficiently informed about the way deposit bottles could be returned. It refers to the consumer survey commissioned by Ondrášovka at Mareco, which suggests that 30% of consumers would prefer another non-returnable packaging (non-returnable glass, Tetra Pak, a can) if a deposit were introduced (Kozlík, 2019).

3. Methods and findings

The research was conducted by IPSOS in October 2018 on a representative sample of the Internet population of the Czech Republic aged 18-65 with 1000 respondents. The research was carried out using the IPSOS online panel Populace.cz. A questionnaire was created to assess the behaviour and attitudes of the population to the recycling of PET bottles. The identification questions used in the analysis are a standard part of the Populace.cz panel. They are gender, age categories, net household income, as well as media behaviour, shopping habits, household amenities, etc.

Segmentation was made by TwoStep Cluster Analysis ISM SPSS 21. The TwoStep Cluster Analysis procedure is an exploratory tool designed to reveal natural groupings (or clusters) within a dataset that would otherwise not be apparent. The answers to question P1 were in the Likert scale (definitely yes, rather yes, rather no, and definitely no) were transformed into two yes/no categories.

3.1 Current recycling behaviour

The matter of waste separating was surveyed as follows: P1: Do you throw used PET bottles in your home into separate waste containers? Cross tabulation is shown in Table 1:

Table 1: Dependence of motivation to return used PET bottles and net monthly household income

Net household income		**P1**. Do you throw used PET bottles in your home into separate waste containers?		
		Yes	**No**	**Total**
> 20k	**Count**	202	23	225
	% within P1	21,7%	32,4%	22,5%
	Adj. residual	-2,1	2,1	
21 - 50k	**Count**	598	39	637
	% within P1	64,4%	54,9%	63,7%
	Adj. residual	1,6	-1,6	
51k+	**Count**	129	9	138
	% within P1	13,9%	12,7%	13,8%
	Adj. residual	0,3	-0,3	
Total	**Count**	929	71	1000

When asked "*Do you throw used PET bottles in your home in separate waste containers?*" almost all respondents (93%) replied that they were throw used PET bottles into separate waste containers. Only 7% of respondents do not throw used PET bottles in separate waste containers.

Other attributes of current recycling behaviour have also been examined. Most sociodemographic identifications of respondents do not differentiate neither in terms of access to the waste separation of PET bottles P1 nor in the willingness to participate in the deposit system P2. The exception is partly the household income and the age of the respondent, as shown in table no. 1

Although the statistical significance of dependence of net monthly household income and sorting of plastic waste ($p = 0.115$) was not confirmed, however, in the lowest income group (> 20 T CZK) is a higher percentage of households that do not manage plastic waste (adjusted residuum 2.1).

3.2 Find out if a refundable deposit motivates

The question was: “Some beverage producers are considering starting to return a deposit for PET bottles, just like for glass bottles of beer and other drinks. Would a deposit motivate you to return used PET bottles to the shop?" This question was examined in the form of the Likert scale shown in Table 2.

A majority of respondents state that a deposit on used PET bottles would motivate them to return them to the shop. 63% of respondents state that it certainly would, 26% state that it is likely it would. On the contrary, only 11% state that the deposit would not motivate them to return PET bottles to the shop (4% certainly yes, 7% rather yes).

The motivation of the refundable deposit was closely examined in relation to the current recycling behaviour, as shown in table no. 2.

An important result is that those respondents who do not sort plastic waste in their household would also be significantly less motivated by the deposit on PET bottles and to return them to the shop. (significance $p=0.001$, adjusted residuum 3,3).

Table 2: Dependence of motivation to return used PET bottles by a financial deposit and current behaviour

		P2. Would you be motivated to return used PET bottles to a store by a financial deposit?		
		Yes	**No**	**Total**
Those who throw used PET bottles into separate waste containers	**Count**	807	51	858
	% within P2	90,4%	77,3%	89,5%
	Adj. residual	3,3	-3,3	
Those who **do not** throw used PET bottles into separate waste containers	**Count**	86	15	101
	% within P2	9,6%	22.7%	10,5%
	Adj. residual	3,3	-3,3	
Total	**Count**	893	66	959

3.3 To find out the incentive power of the bottle deposit system and the optimal amount of the deposit

Respondents answered the question: "How high would the deposit in CZK for one PET bottle have to be in order to sufficiently motivate you to return the used bottle to the shop?" see tab no. 3:

Table 3: P3. How high would the deposit in CZK for one PET bottle have to be in order to sufficiently motivate you to return the used bottle to the shop?

CZK	Frequency	Percent	Valid %	Cumulative %
1	99	9,9	9,9	9,9
2	116	11,6	11,6	21,5
3	276	27,6	27,6	49,1
4	17	1,7	1,7	50,8
5	287	28,7	28,7	79,5
6	5	0,5	0,5	80,0
7	4	0,4	0,4	80,4
8	1	0,1	0,1	80,5
9	1	0,1	0,1	80,6
10 and more	141	14,1	14,1	94,7
Don´t know	53	5,3	5,3	100,0

For the largest group of respondents, 29% would be motivated by a deposit of CZK 5 per PET bottle. Almost the same size group of 28% of respondents would be motivated by a deposit of CZK 3. A deposit of CZK 1 would motivate 10% of respondents. A high deposit of CZK 10 or more would motivate 94,7% of respondents. However, a higher deposit would influence shopping behavior as the customer would need to pay more for the purchase. A balance should be found between the total price and the motivation to return the bottles. Based on the cumulative result, CZK 5 motivates 80% of consumers. Increasing deposit does not raise the cumulative percentage significantly. It can be concluded, that the optimal value of the deposit should, therefore, be CZK 5.

3.4 To identify the socio-demographic differences of respondents in their attitude to the amount of the deposit (the respondent's age was determined)

To identify socio-demographic differences (and other segmentation criteria), the following results were found out using crosstabs and shown in table no. 4:

Table 4: Amount of the preferred deposit for a PET bottle

		Age					**Total**
		18-24	**25-34**	**35-44**	**45-54**	**55**	
1 CZK	**Count**	17	14	20	25	23	99
	% w. x.	18,5%	8,6%	10,3%	14,9%	12,4%	12,3%
	Adj. residual	1,9	-1,6	-1,0	1,1	0,0	
3 CZK	**Count**	31	58	56	48	83	276
	% w. x.	33,7%	35,6%	28,9%	28,6%	**44,6%**	34,4%
	Adj. residual	-0,1	0,4	-1,9	-1,8	**3,4**	
5 CZK	**Count**	26	63	81	59	58	287
	% w. x.	28,3%	38,7%	**41,8%**	35,1%	31,2%	35,7%
	Adj. residual	-1,6	0,9	**2,0**	-0,2	-1,5	
10 CZK	**Count**	18	28	37	36	22	141
	% w. x.	19,6%	17,2%	19,1%	21,4%	11,8%	17,6%
	Adj. residual	0,5	-0,1	0,6	1,5	-2,3	
Total	**Count**	92	163	194	168	186	803
	% w. x.	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Legend: % w. x. – within XC3k

The amount of the preferred deposit for the PET bottle and the respondent's age category are dependent (p = 0,12). It turned out that respondents of the highest age category prefer a deposit of CZK 3 and are, on the contrary, least inclined to pay a deposit of CZK 10.

3.5 Segmentation by the willingness to participate in the PET bottle deposit return system

The willingness to participate in the PET bottle deposit return system relates to the media behaviour of respondents while watching TV. With the help of a Two-step cluster analysis of TV station tracking identification "Which of the following channels do you watch regularly - please select the maximum of 3 most often", segmentation containing 4 groups of respondents was created and shown in table no. 5

Table 5: Segmentation according to media behaviour

Segment							
1		2		3		4	
Prima Cool	34,9%	CT1	100,0%	Barrandov TV	100,0%	Nova	94,7%
Nova	26,4%	Nova	87,2%	Nova	86,5%	Prima	70,7%
Prima ZOOM	26,0%	Prima	55,0%	Prima	59,5%	Nova Cinema	52,1%
Total	447		211		74		188

Cluster analysis excluded 80 from a total of 1000 respondents, whose responses contained empty values. 92% of the original file was segmented.

First, the segment with the highest percentage (447 respondents: 48,6%) comprises respondents with the largest range of the watched channels. The three most-watched channels in this segment, Prima Cool, Nova, and Prima ZOOM, were stated by only a quarter to a third of respondents. In this segment, men predominate significantly (61%). (p=0,00; adjusted residuum 5,8) as well as respondents with a university education of 19,2% (p=0,00; adjusted residuum 3,0)

Second segment (211 respondents: 22,9%) 100% respondents here state the public broadcaster ČT1, 87% Nova channel, and 60% Prima channel. In this segment, respondents who graduated from secondary school are significantly more represented (42.2%). (p=0,00; adjusted residuum 2,3) and respondents living in their own home 53% (p=0,030; adjusted residuum 2,8)

Third segment (74 respondents: 8%) is the smallest. This segment is characterized by the fact that 100% of respondents stated that they were watching TV Barrandov. In this segment, women predominate (65%) (p=0,00; adjusted residuum 2,9), 60% respondents with apprenticeship. (p=0,00; adjusted residuum 4,1) and respondents from the lowest income group >20 T CZK (35%). (p=0,026; adjusted residuum 2,7)

Fourth segment (188 respondents: 20,4%) is the segment with the largest range of Nova (95%) and Prima channels (71%), which also relates preference of Nova Cinema (52%). In this segment, women predominate (61%). (p=0,00; adjusted residuum 3,6)

The most significant difference is in the third segment, where 22% of the respondents are not rather motivated not motivated at all by the PET bottle deposit to participate in the system (p = 0.009; adjusted residual 3.4). The other three segments declare their motivation by the deposit on PET bottles.

Table 6: Segment with the least willingness to recycle

		Two-step cluster Cluster Number				
		1	2	3	4	Total
Certainly yes + likely yes	**Count**	393	181	56	159	789
	% w.c.	90,1%	91,0%	77,8%	90,9%	89,5%
	Adj. res.idual	0,7	0,8	-3,4	0,7	
Certainly no + likely no	**Count**	43	18	16	16	93
	% w.c.	9,9%	9,0%	22,2%	9,1%	10,5%
	Adj. residual	-0,7	-0,8	3,4	-7	

		Two-step cluster Cluster Number				
		1	2	3	4	Total
Total	**Count**	436	199	72	175	882
	% w.c.	100,0%	100,0%	100,0%	100,0%	100,0%

Legend: % w.c. – per cent within a cluster

3.6 Identification of segment least willing to recycle PET bottles

The aim of the study was also to identify a consumer profile that shows the least willingness to recycle plastic bottles in the form of a refundable deposit. Using a cluster analysis (table no. 6) the following results have been reached.

The group that does not intend to participate in the deposit return system is small (third segment 8%), it is predominated by women, respondents with lower education, income, elderly people, and frequent viewers of TV Barrandov.

4. Conclusions and discussion

The study described current recycling behaviour according to individual socio-demographic characteristics of consumers.

It was also established whether a deposit motivated for the recycling of plastic bottles and at the same time its optimal amount was quantified. Sociodemographic differences of respondents in attitudes to the amount of the deposit, which are the respondent's age and partly income, were also identified. A profile of a consumer, who is least willing to recycle in the form of a refundable deposit, is also generated.

The study presents several facts that are an essential basis for the implementation of eco-marketing, both at the government and corporate level. Eco-marketing can significantly help to increase the recycling of PET bottles. This study provides eco-marketing with an important basis for influencing the population towards greater willingness to recycle PET bottles (in the form of the bottle deposit system and store returns).

Limitations: The study did not mention the issue of greater difficulty in returning PET bottles to a shop. The issue is the extent to which respondents are familiar or able to imagine or realize how practically comfortable or uncomfortable the handling of PET bottles, which need to be returned to the shop, will be.

While a PET bottle can be thrown into the sorted waste contaminated and crumpled, the shop will only buy back a clean and intact bottle. Thus, there is an additional consumer discomfort in the form of bottle rinsing, their storage in intact condition, their transport in this state (taking up the place) to the shop, and the very act of returning bottles. Of course, in case of a larger number of bottles purchased in one spending, the price is also increased by multiples of the deposit (with a deposit of 5 CZK and the purchase of 2 cartons of 6 PET bottles, the deposit is 60 CZK). The question for other environmental researchers is whether it is sensible to further improve the current functioning PET bottle collection system by introducing a deposit, or is it not possible to substantially increase the percentage of collected PET bottles by this step?

The issue of the current recycling system is also important. The high incentive for consumers to engage in the PET bottle deposit return system could damage the profitability of the current system (yellow sorted waste containers) if the plastic waste from which PET bottles make up a significant part is greatly eliminated.

However, consumers' willingness to recycle (whether into a container or in the form of a deposit return) should be encouraged by all available means, and this study shows ways of influencing consumers by means of marketing.

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Innovativeness and Entrepreneurial Intentions: Students From Finland, Lithuania and USA in Comparison

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Abstract: Continuous innovation and innovation capabilities are strongly connected to entrepreneurship. Entrepreneurship is driving force of the world economy, and due to the corona-virus, enhancing entrepreneurship is now more important than ever. This study focuses on 126 business students in Finland, Lithuania and USA to find out if the innovativeness is related to entrepreneurship and if there are culture related differences. The result confirmed that innovativeness as well as risk-taking are statistically significantly connected to entrepreneurial intentions. However, there were no culture related statistical differences. Individual qualities seem to have stronger impact on entrepreneurial attitude than culture and these results are discussed at the end of the paper.

Keywords: innovativeness, entrepreneurial intentions, culture, Finland, Lithuania, USA

1. Introduction

Entrepreneurs are regarded as inherently creative and innovative (Drucker, 1985; Schumpeter; 1934; Timmons et al., 1985). Consistent results show that a preference for innovation clearly differentiates entrepreneurs from managers (Carland & Carland, 1991; Stewart et al., 1999; Timmons, 1990). Managers tend to be more adaptive (Buttner & Gryskiewitz, 1993), and to be rewarded for their competence and efficiency (Schein, 1985) rather than for innovation and creative destruction (Schumpeter, 1934). Recent studies have shown that unlike managers, the entrepreneurial mindset is characterized by a high propensity for risk, limited resources, and significant uncertainty that plays into their decision - on the other hand, innovation provides the means for entrepreneurial growth (Estrin et al., 2019)

Ensley, Carland and Carland (2000) have discussed various streams of personality and cognitive research devoted to understanding the entrepreneurial psyche. They suggested that entrepreneurial psyche can be better understood as an individual drive toward entrepreneurial behaviour. Florin, Karri and Rossiter (2007) have defined the Entrepreneurial Drive (ED) as "an individual's perception of the desirability and feasibility to proactively pursue opportunities and creatively respond to challenges, tasks, needs, and obstacles in innovative ways. Individuals with high levels of entrepreneurial drive are generally high achievers, possess high self-efficacy, question the status quo, and have preference for innovative solutions. Studies support the notion of self-efficacy among entrepreneurs, in addition to internal locus of control, need for achievement and a high tolerance of risk (Asante & Affum-Osei, 2019; Kerr, Kerr, & Dalton, 2019). Metanalytical studies appear to suggest a consensus on entrepreneurial personality and cognitive attributes such as need for achievement, locus of control, self-efficacy, innovativeness, stress tolerance, risk-taking, passion for work and proactive personality (Brandstatter, 2011). In case of personality typology there has been tendency that extraverted, intuitive and spontaneous types favour entrepreneurial mindset (Brandt, 2019; Brandt & Helander, 2020).

Maalaoui et al. (2018) propose three major types of entrepreneurial intention research: (1) studies exploring the antecedents of intention; (2) explanations of how an entrepreneurial intention can be put into action; and (3) research seeking to extend the Theory of Planned Behavior (TPB) by adding dimensions to the original formula. Recently, culture's mode of influence (Linan & Jaen 2018) and collective intentions (Brannback, Carsrud, & Krueger 2018) have been studied related to implementation interests. Here the interest is to focus of antecedents of intention. It may be that there are cultural differences concerning innovation abilities and thus the different focus enhancing innovation skills would be needed. Similarly, the entrepreneurial intentions may vary between the countries with young millennials. In order to find out the culturally effective actions the specific knowhow should firstly be gained. So far there are no studies of millennials' cultural differences and innovation and entrepreneurship orientation. Focus of this study are young adults studying in business schools in three different countries (Finland, Lithuania, USA) and compare their innovation and proactiveness on risk-taking and

entrepreneurial intentions. These three countries were selected because they represent different cultures but still represent western countries.

2. Theoretical background

Entrepreneurial intentions reflect a person's willingness to pursue a certain course of entrepreneurial behaviour. Research has indicated that intentions are a reliable and most effective predictor of actual behaviour (Krueger & Carsrud, 1993; Shaver & Scott, 1991). In this study we focus on students' innovativeness, proactivity and risk-taking in relation to entrepreneurial intentions and we will focus impact of respondents' culture. Students represent generation Y (Millennials) and Z when they are between 20 to 30 years old. Y-Generation has been described as the most diverse and eclectic as well as the most protected and observed and they have regarded as optimistic about their futures by seeing life as a smorgasbord of choices, but their confidence and energy have been challenged by recent economic downturns (Elmore, 2010, pp.19; Robbins & Wilner, 2001). Concerning generation Z, Seemiller and Grace (2016) posit that Gen Z as Digital Natives, are also known as Ebay babies and "information curators" resorting to their Google Reflex to interpret the world. They identify as entrepreneurial, but do not see themselves as creative. They also report being excited, yet fearful, about the future. (Strong, 2016).

2.1 Innovative individuals

Psychological and personality characteristics have been shown to be the major determinants that predict the individuals' innovativeness. While some believe it is possible for all individuals to be innovative, it appears to be settled that creating new ideas is just easier for some. In a business setting, a preference for innovation refers to a willingness and inclination toward experimentation and creativity when developing and introducing new products and services (Lumpkin & Dess, 2001). Innovation needs also proactivity, proactive individuals scan the environment for opportunities, show initiative, and persevere until they bring about change (Bateman & Crant, 1993).

Studies indicate that innovative persons are persistent (Hurt et al., 1977; Sandberg et al., 2013), self-confident, open to experience, original, independent and have tolerance for ambiguity (Barron & Harrington, 1981, Patterson, 1999; West, 1987; George & Zhou, 2001; West & Wallace, 1991; as in Andersson et al., 2004). Innovators are also willing to change (Hurt et al., 1977), eager to try new ideas (Rogers & Shoemaker, 1971), and they have tendency to advance problem solving (Scott & Bruce, 1994). Additionally, they have the ability to inspire others and build networks (Akrich et al., 2002). Concerning personality, there have been noted positive correlations between openness, extraversion, and creativity (Bender et al., 2013; Hughes et al., 2013).

2.2 Innovative individuals and entrepreneurial intentions

Entrepreneurial orientation includes innovativeness, risk-taking, proactiveness, autonomy and competitive aggressiveness. It has been shown to influence firm performance, profitability, growth and product innovation in entrepreneurial firms (Johan & Dean, 2003; Avlontis & Salavou, 2007; Moreno & Casillas, 2008; Tang et al., 2008). Harris and Gibson (2008) found that personal control, innovation, self-esteem and achievement with respect to business involvement were correlated with intentions to become an entrepreneur (Harris & Gibson, 2008). Additionally, several researches indicate that past experience with family business is linked with stronger entrepreneurial attitudes (Harris & Gibson, 2008; Zampetakis et al., 2009; Roberts & Robinson, 2010).

Florin, Karri and Rossiter (2007) have studied student attitudes which promote entrepreneurship and found that innovation, nonconformity, proactive disposition, self-efficacy and achievement motivation are crucial in this regard. Other researchers studying students used a variety of measures for entrepreneurial attitudes that included a mixture of attitude and trait measures, often including items referencing risk-taking and innovativeness (Domke-Damonte et al., 2008; Langkamp-Bolton & Lane, 2011; Levenburg & Schwarz, 2008; Macko & Tyszka, 2009; Zampetakis et al., 2009) as well as proactivity (Langkamp-Bolton & Lane, 2011; Zampetakis et al., 2009). Recently, Syed et al. (2020) found out that innovativeness partially mediated the entrepreneurial passion to entrepreneurial intentions relationship. Further, the mediating effect was stronger for individuals who scored high on curiosity than for individuals who scored low on curiosity.

2.3 Culture

Studies on national culture have found interrelationships between national culture and entrepreneurship (Hofstede, 1980; 2000; House et al., 2004). The description of culture as "the collective programming of the mind that distinguishes the members of one group or category of people from another'' (Hofstede, 2001), implies that cultural norms are manifested in individuals' values, norms, cognitions, motivations, beliefs and behaviors. Scholars have identified culture as moderating factor in career choice to be an entrepreneur and start a new business (Moriano et al., 2012; Thornton et al., 2011), theory of planned behavior constructs (Hagger et al., 2007), and entrepreneurial intentions (García et al., 2018). Specific cultural dimensions are likely to strengthen or weaken the relationship between individual factors and entrepreneurial intent (Schlaegel & Engle, 2013). Looking at each of the relevant dimensions, we can identify theoretical and empirical support for this assertion. The relevant dimensions are power distance (PDI), individualism (IDV), masculinity (MAS) and uncertainty avoidance (UAI).

PDI dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. Societies exhibiting a large degree of PDI accept a hierarchical order, control and obedience to those with power (Hofstede, 1980). Everybody has a place that needs no further justification. Previous studies demonstrate that high PDI promotes entrepreneurial activity (Busenitz & Lau, 1996) and that risk-taking propensity in entrepreneurship is moderated by PDI (Antoncic et al., 2018). We hypothesize that PDI will enhanced the relationship between individual factors and entrepreneurial intent.

IDV dimension of individualism refers to societies that prefer a social framework in which individuals are expected to take care of themselves and their immediate families. On the other hand, collectivist societies take care of the larger extended family in exchange for loyalty. According to Hofstede (1980), IDV culture that emphasize "I" rather than "we" are more likely to demonstrate entrepreneurship. More recent studies have found positive relationships between IDV and entrepreneurship actions such as venture-capital investments (Gantenbein et al., 2019). We expect IDV to be related to entrepreneurial intent.

Uncertainty avoidance (UA) dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. High uncertainty avoidance implies that the society exhibits strong beliefs and norms of behavior and is uncomfortable with new ideas and the unknown. One study has found a negative relationship between UA and different attributes of entrepreneurship such as innovation (Shane, 1993), risk-taking (Kreiser et al., 2010) and early-stage entrepreneurship (Arrak et al., 2020).

Masculinity (MAS) represents a preference for achievement, heroism, assertiveness, and material rewards for success. MAS has also been associated with traditional male values such as compensation, recognition and career advancement (Hofstede & Hofstede, 2005). These traits are somewhat perceived to be necessary in entrepreneurship. Numerous studies found support for this perception (Heilman, 2001). However, recent studies have pointed to sociocultural biases (Pecis, 2016) and gender blindness in research may conceal the gendered nature of innovation processes (Dheer et al., 2019). We expect MAS to be related to entrepreneurial intent.

3. Procedure, method and sample

3.1 Sample

Sample was collected from 126 business students from Finland, Lithuania and USA in higher education (universities of applied sciences and universities) during the spring 2020. From Finland there were 51 respondents, from Lithuania 24 respondents and from USA 28 respondents. Nine of the students were international, and there were additional students from Central Europe as well, those were not included into analyses. Background information was voluntary to fill, so if the respondents wanted to have total anonymous, thus we do not have demographic information. However, the most of the students represented millennials or generation Z.

Countries were selected based on the different backgrounds concerning entrepreneurship; USA has known to be very entrepreneurial country, Finland belongs to Nordic welfare countries and Lithuania has been under Soviet Union until 1990, and thus communism as background might have effect on entrepreneurship.

Background information about the countries shortly:

- Finland has 5,5 million population. GDP per capita is 43 500 USD. Largest sector of the economy is service sector, followed by the manufacturing and refining. 38% of Finland's population has a university of college degree, which is among the highest percentages in the world, education system is based on public system and it is free (Statistics Finland, 2020).
- USA has population 330 million, GDP per capita is 65 100 USD. Largest sector of the economy is service sector. About 70% of students study at public sector at higher education. World's best universities come from USA (Harvard, Berkeley, Stanford). (https://www.usa.gov/)
- Lithuania has population 2,8 million. GDP per capita 15 000 USD. GDP has been growing among the fastest during the years 2002 – 2011. Lithuania has 21 universities, and 15 of them are public. Lithuania is mainly catholic as religious base (https://lietuva.lt/en/)

When looking the countries based on Hofstede's dimensions (https://www.hofstede-insights.com/country-comparison/):

- the Power Distance is the lowest in Finland and the highest at Lithuania
- the Individualism is the highest at USA and the lowest at Lithuania
- The Masculinity is the Highest at USA and the lowest at Lithuania
- The Uncertainty Avoidance is highest at Lithuania and the lowest at USA

Earlier studies indicate that high Power Distance, Individualism, Masculinity and low Uncertainty avoidance indicate entrepreneurial tendencies, thus USA would have most tendencies according to Hofstede's dimensions.

3.2 The questionnaires

Entrepreneurial intention was measured with following question: *How likely it is that you will become an entrepreneur at next 5 years?* Scale was Likert-scale (1-5): 1=I will definitely not start a business 5=I will definitely start the business.

Risk-taking was measured with six either-or questions. The scale has been used in the Finnish sample measuring risk-taking and it shows clear differences (Brandt & Helander, 2020). There were three questions measuring success related risk-taking, one for security and one for competition related risks. E.g. " a) Do you start working only with that kind of projects, whose success is relatively sure or b) If you want to succeed, you must take risks?" Factor analyses (Varimax) indicated single-construct solution of five questions, and having Cronbach's alpha 0,640.

Innovativeness and proactiveness Altogether 16 questions were formed about innovativeness and proactivity based on earlier studies (e.g. Langkamp-Bolton & Lane, 2011) of the topics. Likert scale was 1-7 (1=Never or almost never to 7=Always or almost always). Innovativeness was measured using e.g. the following items: "How often you look for opportunities to improve things?", "How often you wonder how things can be improved?" "How often you create new ideas?". Proactiveness was measured the items e.g. "How often you try to convince people to support on innovative idea?", "How often do you put effort in the development of the new things?", "How often do you make suggestions to improve current products or services?" Factor analyses (Varimax) produced 8 items for both dimensions and reliabilities were very good: for Innovativeness Cronbach's alpha was 0.903 and for Proactiveness Cronbach's alpha was 0.899. Both the Innovation and Proactivity dimensions were further divided to two dimensions; high and low groups: High Innovation and Low-Innovation groups as well as High-Proactivity and Low-Proactivity groups. The distribution was made dividing respondents based on 50%/50% proximate. Accordingly, the Low-Innovation group included 57 persons (45%) and High-Innovation group 69 persons (54,3%), when dividing people in the middle point 5. Low-Proactiveness group included 60 persons (47%) and High-Proactiveness group 62 persons (49%), when dividing people at middle point 4,625.

4. Results

4.1 Innovation, proactiveness and entrepreneurial intentions comparisons by country

The overall view is presented in Table 1, where the means of Innovation, Proactiveness and Entrepreneurial Intentions are presented in general and from a country level. Statistical analyses (Anova) indicated no

differences between countries concerning innovativeness, proactiveness, risk-taking and entrepreneurial intentions. However, when looking the means, Lithuanian has the highest mean and US has the lowest.

Table 1: Innovativeness and proactiveness and entrepreneurial intentions, means and SDs of country comparisons

	Innovativeness mean (SD)	**Proactiveness mean (SD)**	**Risk-taking mean (SD)**	**Entrepreneurial intent. mean (SD)**
All data n=126	4,99 (1,019)	4,63 (1,099)	1,70 (0,30)	2,90 (1,275)
Finland n=51	5,10 (0,739)	4,72 (1,032)	1,70 (0,27)	3,00 (1,327)
Lithuania n=24	**5,31 (0,808)**	**4,76 (1,047)**	**1,76 (0,31)**	**3,25 (1,152)**
USA n=28	*4,75 (1,109)*	*4,58 (0,932)*	*1,63 (0,34)*	*2,75 (1,323)*

4.2 Innovation, proactiveness and entrepreneurial intentions all data

Correlation analyses produced statistically significant relations between innovativeness and risk-taking and innovativeness and entrepreneurial intentions as well as proactiveness and risk-taking and entrepreneurial intentions (see Table 2). According to t-test the statistically significant differences occurred between low and high groups of innovativeness and proactiveness in both risk-taking and entrepreneurial intentions (see Tables 4 & 4).

Table 2: Correlations of factors (**. Correlation is significant at the 0.01 level (2-tailed))

		Innov.	**Proactiv.**	**Risk-Taking**	**Entrepr. Int.**
Innov.	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	121			
Proactiv.	Pearson Correlation	,000	1		
	Sig. (2-tailed)	1,000			
	N	121	121		
Risk-Taking	Pearson Correlation	**,245****	**,272****	1	
	Sig. (2-tailed)	,007	,003		
	N	120	120	126	
Entrepr. Int.	Pearson Correlation	**,321****	**,358****	**,483****	1
	Sig. (2-tailed)	,000	,000	,000	
	N	119	119	124	125

Table 3: High and low group of Innovativeness in relation to risk-taking and entrepreneurial intentions, *t*-test

Innovativeness Independent Samples Test Levene's Test for Equality of Variances

	F	Sig.	t	df	Sig. (2-tailed)
Risk-Taking	2,054	,154	-3,582	119	,000
			-3,569	114,609	,001
Entrepreneurial Intentions	2,185	,142	-3,943	118	,000
			-3,960	117,456	,000

Table 4: High and low group of proactiveness in relation to risk-taking and entrepreneurial intentions, t-test

Proactiveness Independent Samples Test Levene's Test for Equality of Variances

	F	Sig.	t	df	Sig. (2-tailed)
RiskTaking	,326	,569	-2,444	123	,016
			-2,438	116,597	,016
Entrepreneurial Intentions	2,015	,158	-3,852	122	,000
			-3,901	120,355	,000

5. Discussion

This study focused on innovation and entrepreneurship and culture, in order to investigate culture-related impact on innovation and proactiveness orientation as well as entrepreneurial intentions. Three different cultures were Finland, Lithuania and USA. The results can be regarded preliminary because amount of data was rather small. However, these preliminary results indicated that culture does not impact innovativeness, proactiveness, nor entrepreneurial intentions and risk-taking. When looking the means of those qualities, the students from Lithuania seem to be the most entrepreneurially orientated and students from USA the least entrepreneurially orientated.

Even though there were no differences between the cultures the Innovativeness and Proactiveness dimensions resulted interesting findings. It seems like the individual qualities have stronger impact on entrepreneurial attitude than culture. Both Innovativeness and Proactiveness were significantly correlated with aims to start own business in 5 years time and tendency to favour risk-taking. Also, risk-taking correlated with aims to start business. According to this study, innovativeness and proactiveness are strong predictors of entrepreneurs. The findings also confirmed that risk-taking is connected to entrepreneurship.

Our preliminary results lead us to make several interpretations. It is possible that the millennial generation and beyond are increasingly experiencing a more global and digital culture that diminishes the influences of national cultural dimensions. These generations are gradually developing a more idiosyncratic culture shaped by their immediate social environments, digital space and peers. In addition, younger generations are likely better educated and worldly parents more focused on buttressing proactive achievement norms and values as they seek to prepare their children for a better world. Ultimately, the immediate social and educational environments are likely to play a more instrumental role in shaping cultural values.

Earlier studies indicate that innovation may be increased when creativity is supported and promoted in an organization, and even individuals "who lack the natural inclination to be creative may become creative" and the leaders are key in enabling this (Škerlavaj et al., 2014; Zhou & Hoever, 2014, p. 353). Collins and Cooke (2013) reported that when looking to increase performance, having a creative manager is particularly important for those individuals who are not particularly open to change. At the education the innovation capabilities should be encouraged in various forms, to encourage already innovative people to reach more and less innovative people to develop their innovative side also.

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Innovation Processes of the Finnish SMEs: Corona Challenges Speed up Innovations

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Abstract: This research studies innovation processes of companies during the corona crises. Interest was to see if the corona as disruption impacted companies' innovativeness, sources of innovations and motivation of entrepreneurs. The studied entrepreneurs were applied and received 110 000 euros support for new developments from the Business Finland during the year 2020. Altogether the seventeen entrepreneurs of various fields were interviewed. Results indicated that part of the entrepreneurs developed totally new functions due to the corona crises. Benefits of crises were partially new aspects to businesses were found and also development of the business was fast. All the entrepreneurs said that development was part of the company's daily work and despite the crises the possibility to innovate gave to them motivation to work.

Keywords: entrepreneurship, innovativeness, leadership

1. Introduction

As Johnson et al. (1997) have said companies must be innovative in order to survive changing ecosystem. The corona crises brought suddenly new challenges to companies. The methods for preventing the disease for spreading around have had direct and indirect effects for entrepreneurs. Finnish government supported companies in different ways to enhance survivor from the corona-time. Interestingly, the situation also gave benefits to some companies, like companies focusing on home decoration and spa furnitures (see e.g. Brandt, 2020).

Continuous innovation and development are common nominators for successful companies (Kuratko, 2009) and innovations clearly impact on performance (Deshpande et al., 1993; Yamin et al., 1997). According to Hult et al. (2004), the successful companies are connected with capacity to innovative as well appreciation of innovativeness supported by cultural preparedness. Innovativeness is important to foster the competitiveness (Chesbrough, 2003), and bringing the competitive advantage (Porter, 1985).

The innovative entrepreneurs are more successful than their less innovative colleagues (Kropp, 2006) innovative behavior of employees has great significance for the company (e.g. West et al., 2004). Due to the importance of the innovativeness, there is plenty of studies how to enhance creativity and innovativeness in organizations. Organization which have strong innovative culture support development of new and useful ideas, challenge old ways of doing things and encourage employees to learn from others inside and outside from organizations (Pillinger & West, 1987; Van der Vegt et al., 2005). In case of leadership, it has been noted that it is important to notice and support entrepreneurial minded employees who notice new opportunities and innovate and thus improve company's competitive advantage and profitability (Kristiansen, 2019).

This research studies innovation processes of companies during the corona crises with the companies who received the innovation funding. The situation with the companies during corona loaded considerably huge amount of stress towards innovativeness and thus the research had good possibilities to study the subject with entrepreneurs from various fields. We were interested entrepreneurs motivation in difficult times, leadership style in case of innovativeness and sources of innovations and development ideas.

2. Innovativeness and entrepreneurship

Innovations can be related to e.g. new technologies (Christensen 1997; Sainio et al., 2012), products (Christensen & Raynor 2003; Markides 2006) or business models (Chesbrough 2003; 2010; Markides 1997, 2006; Hamel 2000; Christensen ja Raynor 2003; Bouwman et al., 2009). In western countries first innovation thoughts were produced by Schumpeter (1934), when innovations related to economic growth were connected to new products, processes, markets and materials. In the business the innovation means tendency and willingness

towards creativity and experiments when developing new products and services (Lumpkin & Dess, 2001). Innovation is new, unique and important. It produces new releases to markets and ecosystems (Frankelius, 2009). Innovativeness means breaking down the security or traditions, willingness to try new ideas, and inventiveness (Csikszentmihalyi, 1996; Rogers & Shoemaker, 1971). Curiosity and enthusiasm to problem solving are regarded as first signs of innovativeness (Amabile; 1997; Root-Bernstein 1989; Stefik ja Stefik, 2004). For example, problem solving can be totally new way of producing new customer solutions (Sandberg ym, 2013).

At the following chapters we build the hypothesis for the study:

H1. Entrepreneurs are driving force for innovations

H2. Entrepreneurs have leadership style that enhances innovativeness and implementation

H3. Entrepreneurs are open to new ideas and gather ideas from wide sources

2.1 Innovative entrepreneurs model the way

The motivation and personal attitude of the self-employed in carrying out their business activity has been considered as an influential factor on innovation and other energizing initiatives of SMEs (e.g Romero & Martinez-Roman). Innovative behavior has been argued to be largely a motivational issue (Amabile, 1988). Plenty of research shows that entrepreneurs are regarded as creative and innovative (Carland et al., 1984; Drucker, 1985; Fairly & Holeran, 2011; Schumpeter; 1934; Timmons et al., 1985) even in the light of the research some entrepreneurs are more innovative than others (Cliff et al., 2006; Koellinger, 2008). Plenty of research show that innovativeness is distinctive factor from entrepreneurs from leaders (Carland & Carland, 1991; Stewart et al., 1999; Timmons, 1990). Leaders usually have more adaptative than innovative style (Buttner & Gryskiewitz, 1993) and usually they are guided toward innovativeness than effectiveness (Schein, 1985; Schumpeter, 1934). It has been noted that highly innovative persons have same qualities than entrepreneurs, like capacity to take risks, high tolerance of uncertainty, high persistence and self-esteem (Howell & Higgins, 1990; Hurt et al., 1977; Rogers, 1983). Personality of entrepreneurs are toward intuitive and spontaneous (Brandt & Helander, 2020) which are regarded innovative personalities as well, as Routamaa et al. (2016) concluded when they studied personalities of innovative entrepreneurs. Additionally, they have openness to changes, curiosity and interest of problem solving (Howell & Higgins, 1990; Rogers, 1983; Root-Bernstein, 1989; Scott & Bruce, 1994). Based on the earlier studies, we suggest that:

H1. Entrepreneurs are driving force for innovations

2.2 Enhancing innovative culture via leadership

It has been noted that leadership impacts on innovativeness at working community. Leadership impacts clearly on organizational culture and companies with highly innovative culture support developing new ideas and challenge old ways to do things. Those cultures also encourage employees to learn from others inside and outside of organization (Pillinger & West, 1995; Van der Vegt et al., 2005). In case of different leadership styles, the transformational leadership enhances innovativeness (Jung et al., 2003; Uusi-Kakkuri et al., 2016).

Innovative culture is defined as common view of practices, processes and behavior, which enhances creation and development orientations and noticing new useful ideas (Van der Vegt et al., 2005). This kind of culture impacts on individuals' creativity and teams' innovativeness. For example, Kant et al. (2016) studied CEOs and leaders, and they noticed that innovative culture was positively and indirectly connected to employees' innovative behavior in certain situations. Additionally, proactive culture as well supportive culture for risk-taking strengthened individual's interest on innovativeness and creativity.

Besides creating culture that enhances the new ideas and innovative thoughts the selecting and implementing the chosen alternatives is important phase and needs support from leadership (Hammond et al., 2011). It may easily happen that good ideas are just talked but nobody has time or energy to implement those. It is understandable that highly novel ideas are more difficult to implement than moderately novel ideas due to their out-of-the-box, risky nature (Baer, 2012).

Based on the earlier studies the hypothesis is formed:

H2. Entrepreneurs have leadership style that enhances innovativeness and implementation

2.3 Sources of innovations

As Nonaka and Takeuchi (1995) have suggested that the increase of the diversity of creative individuals in work places provides a platform to create and exchange diverse sources of original knowledge and experience. Networks inside the organization are important sources of innovation according to some studies (Pennings & Harianto, 1992; Powell et al., 1996). Networks enhance technological innovations (Holmen et al., 2005) and company's innovativeness overall (Hausman, 2005). The customer interface is useful source of innovations, when changing the views of knowledge, information, experiences, opinions, cultures and resources is possible (Yliherva, 2006). The activation of customers and end-users is very easy nowadays with the help of technology and also because people are more and more willing to participate on development work (Bovaird & Loffler, 2012). Based on the research we suggest the following hypothesis:

H3. Entrepreneurs are open to new ideas and gather ideas from wide sources

3. Methodology and research process

We took random sample of SME-entrepreneurs from the list of funding received from the Business Finland. This funding given supported new innovations and development ideas in order to enhance the opportunity to development business during the crises. Support from Business Finland was divided from two phases. Firstly, firms could apply 10 000 euros for investigating different possibilities of new innovations, secondly they could apply 100 000 euros to implement the ideas. Altogether at the list there were 250 companies who received maximum amount of 110 000 euros.

We conducted interviews with 17 entrepreneurs, five of those were women. Those were representing different areas like producing, marketing, producing furnitures or softwares and e.g. offering therapy. The amount of the employees varied from 1 to 40, and turnover varied from half million to four million euros. The interviews were made at Finnish and each interview took 30 minutes to one hour.

Research team was modifying the questions and discussed about those carefully before locking them. We did use half-structured method when conducting interviews and the following questions were asked:

- How did the idea of the innovation and development started? Did you had the idea already before applying the funding?
- Did you had team for progressing the idea? If what kind of team?
- How the development orientation is seen in the daily life of your firm?
- How do you lead innovativeness in your company? What does it need to enhance innovativeness?
- How do you benefit from customers' and partners' views in development work?

The interviews were recorded and transcripted and the transcripted texts were content analyzed based on the themes.

4. Results

Results here are divided into the following order, first the beginning situation is described, what was the starting point to act, secondly general innovation behavior at companies and how it is lead.

4.1 Starting point: Impact of the corona to innovativeness

Most of the entrepreneurs told that idea for development was already ready before applying the funding, but the corona-situation did either force to act or the Business Finland funding gave opportunity to foster the function of the company. The situation came fast to all companies, and some companies were in the point that they had to make the decision if they will try to survive with doing something or not. The funding was important possibility for many.

> *"When corona stopped Finland, we applied right away the funding for investigation of possibilities. From those possibilities, us as owners of the firm, eliminated best ideas which we were sparring with the board of directors and then we did forward those to implementation"*

"It was that, at spring everything stopped and there were no activities. We could not do anything. We were some time only thinking, that should we do something or not. Then we decide to do. And then the news came, that this kind of support can be applied"

"It (innovation) did come just because of the corona"

"It was because of this, that we were thinking how to adapt on this situation"

Even some had had the innovation ideas already, the priority had been in other things. Some commented that, lack of resources in micro- and small companies forces to choose carefully ideas that will be developed forward. For example, one entrepreneur commented that at the beginning of the firm, there was too much innovation and ideas and not enough selling, and thus they decided to have a pause in case of innovations to focus to gain some cash flow. Some said that due to the corona-pause for business, there was good time for development and innovations, even the idea did have been long time in the mind. The digital leap had been in mind of some entrepreneurs, and now it was right time for action. This digital leap did change the mindset of the people and customers and in that way enhanced some companies work.

"Corona did bring totally different jump here how to build the business. The thoughts have been but the corona forced to act"

"Years ago I had been thinking this kind of function, but it felt that world was not ready yet"

"People are more open to different kind of services and meetings. I experience, that it is the huge help. It has societal impact as well, because it is cheaper"

4.2 Inner motivation helps during the crises

Many entrepreneurs said that possibility to innovate is the main motivation of their work, and that they enjoyed the variety of their life despite the challenges that entrepreneurship brings some times.

"I would say that this innovative field is the thing why we wake up every morning and go to work. Of course, it is nice that we have good teams, but the other thing is that field is so fast changing, that we must be awake all the time, so that we see where the market is going and where the next threat of possibility comes"

"My own curiosity is reason for innovations. I start to feel that I need new people and places. I am not rewarded by routines, I need stress and speed"

"We do it every day when we are at startup-phase and product development phase, and when developing the processes and functions. I have the interest to belong on those (innovations), absolutely.

4.3 Enhancing innovativeness

Leading development ja innovative actions varied from spontaneous actions more structurized way of processing, however in every case the innovative thinking was encouraged by leadership. Some said it is very informal way of leadership and in some cases it was lead systematically. Working style was non-hierarchical and employees and entrepreneurs worked as a team. With low hierarchy the new and different thoughts are gained, which is usually prevented by hierarchical leadership and even encouraging people to disagree with them. According to research, transformational leadership has impact on innovativeness at organizations, when leaders constantly encourage for new thoughts and thinking and questioning the status que (Jung et al., 2003; Uusi-Kakkuri et al., 2016).

"First encouraging thing is that, you should not have too negative or closed mind and you should not discard presentations and thoughts. If you have very closed mindset, nobody wants to present anything."

"It is lovely, if I get feedback, that the decision was not good and they need to take another decision. I think it is great that they have courage to do that".

"We have fast company with low hierarchy, that it is just that lets take Teams-meeting and then lets decide what we will do"

"The development is done all the time and we function as a lean-way. The personnel form a team and we do not have hierarchy. We have systematic development days four per year."

> *"We don't have any plans for innovation, we do not put those in the calendar. It is more like artistic-style. We get the inspiration and then we let just try this"*

Some entrepreneurs noted that they themselves should be cautious when they can be restrictions in case of new ideas, as thinking themselves as limitation with burden of history.

> *"The biggest risk is that we as owners, who are two persons, that we start to behave as restrictive elements. We have the restrictive weight from history, and when somebody tries something new, we just say that it did not work earlier. However, it may be that it would work now."*

Time and resources were mentioned by some entrepreneurs. It is important to give time and book time to enhance new developments and innovations. Even it costs a lot to start ups and small companies to arrange meetings that are not strictly related to cash flow, respondents regarded that the time should be every case given.

> *"You should always give time for innovation, that is the first thing. If you are doing all the time your daily work the risk is it that your brains do not turn to other side (innovation). The time should be given, if there is not that, then you can forget everything. When we book before the time, then you cannot do anything else, and this is the only thing to work this forward"*

> *"We have endless wish lists as where are all the ideas from different areas. Then we start working with those, and consider resources and profits. It should not be too often, because it takes time in this kind of 15-persons company, but once a month the small workshop has been arranged. It is only 2 hours, not too long and artificial"*

> *"It is also part of the culture, that sometimes we sit down and think what is new and what has came up from customer cases and needs, and what kind of opportunities…it is like continuous process, how we forward that.."*

Usually innovative ideas were further developed just with the open discussion and spontaneously, but in some cases there were clear processes. For example, ideas gained from "the field" are raised to discussion in weekly meetings, and after that entrepreneurs themselves are considering and developing the idea further. After this they will consider innovation with board of directors. Spontaneous action could be seen just taking the moment and trying to do. Some companies do not do some much process based, they just act when getting inspired.

4.4 Sources of innovations: Customers

Companies were very eager to take feedback and development ideas from customers, partners and colleagues from co-operative companies. Even employees were innovating and developing also, the roots of many innovations were coming from customers. At some cases, team leaders forwarded the ideas from customers to general discussion and then the ideas were processed via more systematic process. Part of the entrepreneurs regarded customer relationships more like partner relationships and in one company customers are included into second phase of innovation process. Benefit for having customers as developers as well, is that then they engage to the company even more, so it is also the way to get loyal customers. Feedback gathering and questionnaires are one way to activate the customers.

> *"Due to the business, we have very active customers and team leaders. We get a lot of ideas and thoughts, and from customers it is minimum to get yearly feedback and development ideas. Also around the year we get ideas with exit-interviews also. Once a year we have with every customer group discussions, and this information is shared with team leaders. We discuss about feedback and ideas. This is continuous process; all the time colleagues are telling for each other what could be done"*

> *"We have co-operation companies, who are doing the same work. And together we can utilize others' ideas in our work"*

> *"We take continuously feedback and ideas from customers. The relationships are more like partnerships."*

> *"Sources of ideas have been co-operation with companies, and with some employees and around the Finland colleagues and also with customers.*

"Many ideas come from customers. They know that we are eager to develop things, and from their side come plenty of ideas. And also they affiliate the product more when having being part of the development process"

"Quite much those has been done with wishes and temptations of customers. Sometimes there can be tens of customers testing and piloting the product"

Usually there was team which started working with the idea forward which was selected based on company's mission which impacted which idea were chosen. For example, one company's mission was to reduce costs for society (besides doing profitable business), so this helped the process of choosing. Some companies had consults in order to solve the process and customer needs. Also, the main customers were contacted to get their views of the next steps.

"We had the questionnaire for customers to get ideas for working idea forward"

"We had about 4-5 persons core team who were participating on this, and also we used help from consultant during the idea forming phase. Some parts of the projects were bought as subcontracts from others"

"Also in this funding, the customers have been very active in the process"

5. Conclusions

Based on this study, all the hypotheses were supported. The corona crises gave speed to innovative processes of the companies. At some companies the ideas and thoughts were ready, but received funding gave resources and also duties, which helped action. In some cases, the situation was forced, so there was not any other choice than develop something new if the company wanted to survive. All the companies were very open to development and innovativeness, and in some cases the corona situation was approached as any problem-solving situation which needs innovative thinking. It can be noticed, that disruption caused by corona, was very difficult to predict, but adaptation and innovations were still done very fast speed in the companies. The fast action was key to survive and some even could take benefit from this disruption. For the comparison it would have been interesting to get chance to interview also those entrepreneurs who did not get innovation funding. If they were they less innovative in their actions. Here the leadership and personal qualities of entrepreneurs had created cultures that enhanced innovativeness. In the future it would be interesting to interview also the employees, in what ways they experience enhancements of innovations. Additionally customers' point of views would be interesting to study – how do these open innovation systems motivate them.

Not just in the case of corona, but all the time the innovativeness was experienced crucial for companies and it was part or the organizational culture. In the daily leadership the active customer feedback was used and customers were also affiliated to company even stronger in this way. Leadership styles based on low hierarchies, showing example, collecting actively feedback and open mindset for new thoughts. The resources and time were given to new thoughts. The motivation of work came for innovation and development and this was shared for all organization.

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Cultural Qualities Needed to become an Entrepreneur

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Abstract: This research is interested qualities to foster entrepreneurship when comparing different cultures. Sample of 126 business students from Finland, Lithuania and USA answered the questionnaire which focused identifying qualities required to start a business. Results indicated some statistically significant differences between the countries indicating different emphasizes needed for starting the business. Lithuanian people would need Self-Esteem and Team to Build Up the Business, and both Lithuanian and US people Decisiveness if becoming entrepreneurs. Results are discussed in relation of cultural history and differences.

Keywords: entrepreneurial intentions, fostering entrepreneurship, culture, Finland, Lithuania, USA

1. Introduction

Entrepreneurial career choices are impacted by entrepreneurial drive (Florin et al., 2007) and cultural values (Dahles, 2005). Culture has direct and indirect effects on different dimensions of entrepreneurship. Culture appears to play an important role in the business process, as cultural diversity can influence the predominant characteristics of entrepreneurship and thus moderate the effects of economic conditions on entrepreneurship (Jaén et al., 2017). Cultural values determine the degree to which a society views entrepreneurship as an attractive or unattractive professional outlet (Liñán et al., 2013). Thus, the level of entrepreneurship varies widely from country to country on the basis of culture (Hunt and Levie, 2003).

Studies on national culture have found interrelationships between national culture and entrepreneurship (Hofstede, 1980; 2000; House et al., 2004). The description of culture as "the collective programming of the mind that distinguishes the members of one group or category of people from another'' (Hofstede, 2001, p. 5), implies that cultural norms are manifested in individuals' values, norms, cognitions, motivations, beliefs and behaviors. Scholars have identified culture as a moderating factor in career choice to be an entrepreneur and start a new business (Moriano et al., 2012; Thornton et al., 2011), theory of planned behavior constructs (Hagger et al., 2007), and entrepreneurial intentions (García et al., 2018). Multiple studies have shown that country's culture has impact on students' entrepreneurial intentions (Liñán et al., 2013; Pruett et al. 2009; Sánchez, 2010; Varamäki et al., 2013) as well as gender, age and personality (Brandt, 2019).

In this study we will widen the area of cultural knowledge in relation to entrepreneurship, in order to provide more country specific knowhow of students' entrepreneurial tendencies and possible limitations. This knowledge is especially useful for entrepreneurial educators. This is preliminary study and countries so far represented are Finland, Lithuania and USA. Interest is to compare students from these countries in terms of entrepreneurial intentions as well of knowhow and attitudes they would need if establishing the enterprise.

2. Earlier studies

2.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) (Ajzen, 1991) is one of the models in the study of entrepreneurial intent in different countries (Autio et al., 2001; González-Serrano et al., 2016; Krueger et al., 2000; Liñán and Fayolle, 2015; Moriano et al., 2012). Ajzen (1991) postulates that behaviour is a function of beliefs that influence a certain behaviour. These beliefs are considered important premises that determine 1) personal attitude, 2) intention and 3) perceived behaviour control. Personal attitude is the favourable or unfavourable assessment that a person makes on the behaviour in question. The second predictor of perceived behaviour is a social factor referred to as subjective norms. Subjective norms refer to the perceived social pressure to perform or not

perform a certain action from people in the immediate environment who exert that influence and pressure. The third antecedent of intention is the degree of perceived behaviour control (PBC) over behaviour, which is the perceived ease or difficulty of the subject in performing an action based on past experiences, as well as difficulties and obstacles perceived by the subject.

The more favourable the subjective norms and attitudes towards behaviour, the greater the perceived degree of control of the individual, leading to a stronger intention to perform a certain behaviour (Ajzen, 1991). However, one of the current unresolved issues is the role of subjective norms, as certain research shows a direct influence of subjective norms on the intentions to undertake a behaviour, while others do not (Figueiredo and Liñán, 2017; Fayolle and Gailly, 2004; Krueger et al., 2000). Certain authors have found a direct influence of subjective norms through personal attitude and perceived control of behaviour (Meek et al., 2010; Moriano et al., 2012).

Previous studies have used TPB to predict certain variables that are related to entrepreneurship. These variables include entrepreneurial intentions, entrepreneurial behavior and entrepreneurial skills and attitudes. Entrepreneurial skills and attitudes are necessary antecedents in the process of effective entrepreneurship. Skills and attitudes are developed through learning, experience and environmental factors. Intention plays a central role in TPB by connecting norms, attitudes and behavioral control with enacted behaviors. Entrepreneurial intention is the "self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future" (Thompson, 2009, p. 676). Entrepreneurial intention is the first step towards taking entrepreneurial action such as contemplating a startup. The second variable of interest is entrepreneurial behavior. Based on the TPB, intentions are correlated with behavior and also linked to behavioral control. Entrepreneurial behavior refers to entrepreneurial actions such as recognizing and exploiting opportunities by reconfiguring existing and new resources in ways that create an advantage" (Zahra, 2005, p. 25). Entrepreneurial behavior is a necessary action that puts entrepreneurial intentions into play.

2.2 Culture

Previous studies have found associations between culture and entrepreneurship. Specific cultural dimensions are likely to strengthen or weaken the relationship between individual factors and entrepreneurial intent (Schlaegel and Engle, 2013). Looking at each of the relevant dimensions, we can identify theoretical and empirical support for this assertion. Commonly used cultural dimensions at research of entrepreneurship are four dimensions from Hofstede, which are power distance (PDI), individualism (IDV), masculinity (MAS) and uncertainty avoidance (UAI). Even Hofstede has defined six dimensions, these four have been noticed to play crucial role regarding entrepreneurship.

Power distance (PDI) dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. Societies exhibiting a large degree of PDI accept a hierarchical order, control and obedience to those with power (Hofstede, 1980). Everybody has a place that needs no further justification. There are contradictory studies of power distance, some studies indicate that high PDI promotes entrepreneurial activity (Busenitz and Lau, 1996) whereas some that low PDI is connected to entrepreneurs (Mueller et al., 2002). Connection to risk-taking propensity in entrepreneurship is moderated by PDI according to Antoncic et al. (2018).

Individualism dimension (IDV) refers to societies that prefer a social framework in which individuals are expected to take care of themselves and their immediate families. On the other hand, collectivist societies take care of the larger extended family in exchange for loyalty. According to Hofstede (1980), IDV culture that emphasize "I" rather than "we" are more likely to demonstrate entrepreneurship. This is supported Lee and Peterson (2000) who found that countries with high levels of individualism develop a greater entrepreneurial spirit. Interestingly, Pinillos Costa and Reyes Recio (2007) also note that the entrepreneurial activity rate of a nation is positively associated with individualism when the country's income level is high; however, when the level of income is low, collectivist culture predicts a high ratio of business creation. Additionally Mueller et al. (2002) study indicated that entrepreneurs tend to have high IDV. High IDV is also related to venture-capital investments (Gantenbein, et al., 2019).

Uncertainty avoidance (UA) dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. High uncertainty avoidance implies that the society exhibits

strong beliefs and norms of behavior and is uncomfortable with new ideas and the unknown. Studies have found a negative relationship between UA and different attributes of entrepreneurship such as innovation (Shane, 1993), risk-taking (Kreiser et al., 2010) and early-stage entrepreneurship (Arrak et al., 2020). Accordingly, Mueller et al. (2002) find out that low UA was related to entrepreneurs.

Masculinity (MAS) represents a preference for achievement, heroism, assertiveness, and material rewards for success. MAS has also been associated with traditional male values such as compensation, recognition and career advancement (Hofstede and Hofstede, 2005). These traits are somewhat perceived to be necessary in entrepreneurship. Numerous studies found support for this perception (Heilman, 2001). However, recent studies have pointed to sociocultural biases (Pecis, 2016) and gender blindness in research may conceal the gendered nature of innovation processes (Dheer et al., 2019).

Thomas and Mueller (2000) conclude that cultural values such as individualism and uncertainty avoidance are significantly related to traits such as internal locus of control, risk taking, and innovativeness, which are associated with entrepreneurship. Some authors (Del Junco and Brás-dos-Santos, 2009) have emphasised that a country's cultural and social values impact personal values of entrepreneurs. However, Hofstede et al. (2004) add a psychological perspective, stating that when individuals are dissatisfied, they tend to become self-employed even though the country's culture of entrepreneurship is not favourable.

For Triandis (2004), collectivists view behaviour as a result of external factors, such as norms and roles, while individualists relate it to leadership, high educational attainment and mobility on the social scale. According to Soares et al. (2007), this theory is useful for formulating hypotheses in comparative studies at an intercultural level. Our study is focussed on Finnish, Lithuanian and US national cultures. Based on previous studies between cultural dimensions and entrepreneurial activity, we are able to develop specific propositions. High individualism and high masculinity appear to be highly correlated to entrepreneurship. Power distance promotes certain aspects of entrepreneurial activity such as risk-taking. Low uncertainty avoidance is likely to be associated with entrepreneurship. Altogether, related to entrepreneurship are high masculinity, low uncertainty avoidance and high individualism.

2.3 Entrepreneurship and Finland, Lithuania and USA

According to Hofstede's assumptions and earlier studies, when comparing these three countries, the *US respondents should have the highest tendency to entrepreneurship* (the highest in individualism and masculinity, the lowest in uncertainty avoidance). Concerning Lithuania the entrepreneurial tendencies should be opposite (the lowest in masculinity and individualism and the highest at uncertainty avoidance. Tendencies of Finnish people should be at middle (middle in others but lowest at power distance).

Study of Gonzales-Serrano et al. (2018) compared entrepreneurial attitudes of eastern and western parts of Europe comparing Lithuanian and Spanish sport students. Lithuanian students had higher predictor variables for entrepreneurship having higher entrepreneurial intentions and perceived behavior control as well as personal attitude compared to Spanish students.

Earlier studies indicate that especially Danish and Finnish people have very positive attitudes towards entrepreneurship (Amway Global Entrepreneurship Report, 2013), and same tendency is everywhere with people under 30 years. Most of the Europeans tend to have more positive attitude towards entrepreneurship than US people, but interestingly the entrepreneurial rate is higher at USA. Additionally, contrary to positive attitudes, Finnish and Danish people are among the lowest who actually become as entrepreneurs. One reason for this has been speculated that only 37% of US people say that they do not have fear to fail when at Europe the fear of failing rate is 73% (Amway Global Entrepreneurship Report, 2013).

At USA small businesses and startups play an instrumental role in the economic and cultural environments, and account for two-thirds of net employment (Dilger, 2018). A significant part of the US cultural heritage that has been linked to entrepreneurship includes the protestant work ethic, freedom and independence (Morris et al., 1994). Lee and Peterson (2000) found that weak uncertainty avoidance, low power-distance, masculinity, individualism, achievement orientation and universalism were conducive to entrepreneurship. Based on a US sample, Mueller and Thomas (2000) found evidence of high individualism and high uncertainty avoidance as being supportive to entrepreneurship. Finally, while comparing the US culture to nine other countries,

McGrawth et al. (1992) concluded that regardless of culture, individualism, high power-distance, low uncertainty avoidance and masculinity were common attributes among entrepreneurs.

3. Methodology

3.1 Sample

Sample was collected from 127 business students from Finland, Lithuania and USA in higher education (universities of applied sciences and universities) during the spring 2020. From US there were 27 respondents, from Lithuania 26 respondents and from Finland 51 respondents. Filling in the background information was voluntary, thus following information concerning gender, age and study field is provided only by some the respondents. In the total sample there was 56 women and 46 men. Most of the respondents were at the age group 21-30 years, including 100 respondents. Under 20 years there were 9 respondents, over 31 years 16 respondents. The study field was business with 105 respondents, technology with 7 respondents and others with 10 respondents.

3.2 The questionnaires

Entrepreneurial intention was measured with following question: *How likely it is that you will become an entrepreneur in the next 5 years?* Scale was Likert-scale (1-5): 1= I will definitely not start a business… 5=I will definitely start the business.

Entrepreneurial tendencies were measured with risk-taking and growth orientation with either or questions, e.g. Security related risk: "*a) Working for someone else the best thing is security or b) You do not need security related to working with others"*, success related risk: "*a) Do you start working only with that kind of projects, whose success is relatively sure or b) If you want to succeed, you must take risks?*"

Skills and attitudes needed were measured with the following questions: What would you need to become and entrepreneur at future (Scale 1= I would not need at all…. 7=I would need a lot). Items were: Courage, Willingness to take risks, Motivation, Self-esteem, Optimism, Resilience, Persistence, Decisiveness, Innovativeness, Mentor to help me, Team to build up the business, More knowledge of entrepreneurship and Good business idea.

3.3 Methods

The possible differences across countries is first evaluated with analysis of variance since some of the variables are measured with nominal scale. In addition to analysis of variance a Kruskal-Wallis test is carried out to reveal a more detailed understanding on cultural differences. Kruskal-Wallis is a non-parametric method for testing whether samples originate from the same distribution. The test can be used for ordinal scale variables and the parametric equivalent is the one-way analysis of variance (ANOVA). Kruskal-Wallis is used for comparing two or more independent samples of equal or different sample sizes. Even the sample size is low the test calculates the differences in medians of two groups (Kruskal-Wallis) and takes the sample size into account. The test statistics follows the chi-square distribution and the sample size is not a problem. Kruskal-Wallis test has been used frequently in comparing entrepreneurship attitudes among students (recently Lacap 2018, Honca & Cetinkaya 2019)

4. Results

4.1 Cultural differences

The means by countries are presented in Table 1. Overall, the respondents thought that if they start business they would need mostly: Good business idea (mean=6.01), secondly courage (mean=5.44) and thirdly motivation (mean=5.52). Optimism and Resilience were having the smallest means (4,98) with all data.

- In USA the order was 1) Good business idea 2) Innovativeness 3) Decisiveness
- In Finland the order was 1) Good business idea 2) Motivation 3) Courage
- In Lithuania order was 1) Motivation 2) Good Business Idea 3) Team to build up the business

When looking the Likeliness to start business, lithuanian students had givent the highest value and US people the lowest. When looking means of all items the Lithuanian people had clearly highest mean, thus they evaluate that they need more entrepreneurial qualities than Finnish and US people.

Table 1: Means of items by country

	Mean ALL	**USA, N=27**	**FIN, N=51**	**LTU, N=26**
Likeliness to start business	2.99	*2.75*	3.0	**3.25**
Courage	5.44	*5.18*	**5.22**	5.83
Take Risks	5.36	5.29	*5.04*	5.79
Motivation	5.52	*5.14*	**5.49**	**6.21**
Self-esteem	5.18	*4.68*	5.00	5.96
Optimism	*4.98*	5.07	*4.73*	5.29
Resilience	*4.98*	5.19	*4.81*	5.22
Persistence	5.29	5.48	*4.89*	5.79
Decisiveness	5.23	**5.57**	*4.73*	5.74
Innovativeness	5.32	**5.61**	5.06	5.50
Mentor to help me	4.99	5.11	*4.81*	5.17
Team to build up the business	5.31	5.18	*4.94*	**6.00**
More knowledge of entrepreneurs	5.17	5.07	*4.71*	5.63
Good business idea	6.01	**5.79**	**5.98**	**6.17**
Means of items 1-13	5.32	5.32	5.02	5.70

At the Table 2 we can see the Risk-taking and Growth-orientation attitude and the Lithuania is having highest mean and USA lowest. Correlations of Risk-taking and Growth-orientation attitude with Planning to start business indicated clear tendencies (significance at the 0.01 level).

Table 2: Risk-taking and growth-orientation attitude means by country in comparison

	All	**USA N=27**	**FIN N=51**	**LTU N=26**
Risk-taking and growth attitude	1.65	1.60	1.66	**1.72**

4.2 Further analyses of cultural differences

A standard analysis of variance reveals that there are no statistically significant differences across these countries in most of the variables except *Self-Esteem* (F = 3,828, p = 0.025), *Decisiveness* (F = 4,332, p = 0,016) and *Team to Build up the Business* (F = 3,750, p = 0.027).

Kruskal-Wallis test reveals that in Self-Esteem (Table 3) and Team to Build up the Business (Table 4) the Lithuanian respondents are different from Finnish and US ones. Lithuanians seem to think more than Finnish and US respondents that they would need Self-Esteem and Team if they would start the business.

According to Kruskal-Wallis test the Decisiveness was lowest in Finland, there were no differences between Lithuania and USA in decisiveness (Table 5). Finnish people tend to think that they do not need decisiveness as much as Lithuanian and US people if starting own business.

Table 3: Self-Esteem as pairwise comparison between countries (Kruskal-Wallis)

	test statistics	std.error	std.test statistics	sig.	adj.sig
USA-FIN	-6.124	6.734	-.909	.363	1.000
USA-LTU	-20.863	7.878	-2.648	.008	.024
FIN-LTU	-14.740	7.080	-2.082	.037	.112

Table 4: Team to build up the business as pairwise comparison between countries (Kruskal-Wallis)

	test statistics	std.error	std.test statistics	sig.	adj.sig
FIN-USA	2.524	6.728	.375	.708	1.000
FIN-LTU	-19.625	7.073	-2.775	.006	.017
USA-LTU	-17.101	7.870	-2.173	.030	.089

Table 5: Decisiveness as pairwise comparison between countries (Kruskal-Wallis)

	test statistics	std.error	std.test statistics	sig.	adj.sig
FIN-USA	12.494	6.678	1.871	.061	.184
FIN-LTU	-16.893	7.122	-2.372	.018	.053
USA-LTU	-4.399	7.903	-.557	.578	1.000

5. Conclusions

Results indicated country specific differences of needed qualities in order to start the business. Good Business Idea was important to everyone, thus it would be important to offer students the innovation related courses where they have possibility to create business ideas and even test those. They could also study businesses and firms on the perspective of business idea formation. Even though there were no statistically significant results when comparing countries some tendencies could be seen in these preliminary results. In addition to Good Business Idea, US students regarded important to have qualities of Innovativeness and Decisiveness, Finnish ones Motivation and Courage and Lithuanian Motivation and Team to Build Up the Business. These country specific tendencies could be taken into account when offering courses related to entrepreneurship and also when encouraging startups. Overall the means of all items regarding qualities needed as entrepreneur, the Lithuanian people had clearly highest mean, thus they evaluate that they need more entrepreneurial qualities than Finnish and US people. Maybe this is due the history of Eastern Europe and communism.

The statistical analyses indicated that Self-Esteem and Team to Build Up the Business are stressed with the Lithuanian respondents compared to Finnish and US ones. Lithuania has been raised from lower-middle income country group in 2011 to high income country to high income at 2017, but it may be that the communist roots are still affecting that thus higher self-esteem is needed especially when related entrepreneurship. Also when comparing Hofstede's dimensions Lithuania has the *highest power distance and uncertainty avoidance* and *lower individualism and masculinity* when compared to US and Finland. High uncertainty avoidance and low individualism and masculinity may be related low Self-Esteem. According to Mueller et al. (2002) entrepreneurs tend to show low levels of uncertainty avoidance, high individualism and low power distance and those qualities are totally opposite when comparing Lithuania with Finland and US. These results of Lithuanias' entrepreneurial self-esteem are in the line of Strazdienė and Garalis (2008) that indicate that college students from Lithuania have medium level of locus of control, so they have to develop more self-confidence to start a business.

However, the interest to start own business was highest by means (even not statistically) in Lithuania. Related to self-esteem, the starting the business may not need so much confidence when doing it with the business partners, as Lithuanian respondents regarded more important than others to have Team to Build up the Business. Thus in regard to Lithuania building entrepreneurial self-esteem and connecting potential business partners would be important when encouraging students to entrepreneurial careers.

In Finland the Courage was in top three qualities, when US and Lithuanian respondents did not have it in so high position. This may reflect the Amway Global Entrepreneurship Report (2013) which indicated that 73% of Finnish respondents had fear of failure concerning entrepreneurship, when US ones had this rate only 37%. Decisiveness was lower in Finland compared to USA and Lithuanian students. This result may indicate that Finnish people think that they have enough decisiveness, as Finnish ethnic heritage and culture stresses the character as know as "sisu" which means quite much like decisiveness and stubbornness, even the direct translation misses (Taramaa, 2009). Maybe the decisiveness could be emphasized with USA and Lithuanian students when

educating them towards entrepreneurs. These preliminary results suggest that the educational policies to be implemented in each of the countries to favour entrepreneurship should be different.

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Strange Bedfellows: Complementary Digitalization in the Norwegian law Sector

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Abstract: Recent developments in digital technologies have challenged the ways in which service firms create, deliver, and capture value. Although research and best practice suggest business model innovation as an effective response to digitalization, many firms are not willing to take radical change in the architecture of the firm's activities. In this study, we take an in-depth look at how existing organizational logics influence the firm's capability for technology-driven business model innovation. As our empirical context, we have chosen the legal industry, notorious for its risk aversion and practices that inhibit innovation, but where the focus on digitalization is increasing due to external pressures. We interviewed nine law firms in Norway, representing together the largest share of the country's legal services market, four of them being traditional law firms and the rest being newly established, born digital New Law organizations. We find that profitability acts both as a driver and an inhibitor of organizational changes. Furthermore, the relatively high job satisfaction of Norwegian lawyers in comparison to the US-based counterparts dampens the pull of technological opportunities on business model innovation. Barring an unexpected profitability crisis, digitalization of the Norwegian law sector will proceed on a complementary, rather than disruptive basis, in relation with traditional business models.

Keywords: business model innovation, service innovation, institutional logic, legal services

1. Introduction

Advances in creating, transferring, storing, and analyzing digital data have the potential to "structure, shape, and influence the contemporary world" (Brennen & Kreiss, 2016, p. 6). Expert-based businesses are expected to be severely affected by the current digitalization wave (Zarkadakis, Jesuthasan & Malcolm, 2016), with professional service firms (PSF) being singled out (Manyika et al., 2013). Digitalization could enable automation and consequently commoditization of knowledge intensive work (Susskind & Susskind, 2015). Christensen (2013) suggest that digitalization will result in a radical transformation of traditional value creation models in favor of more standardized and targeted solutions and processes, integrated in network-based business models. The new approach would be characterized by higher operational efficiency, achieved through automatization and standardization (Smets et al., 2017). The introduction of disruptive digital technologies to legal practice could reshape the sector, creating potential for the emergence of a larger variety of law firms and business models (Susskind, 2010).

These expectations are fueled by the numerous technological opportunities of digitalization for legal practice. According to Skjølsvik et al. (2018), automation and AI will enable law firms to deliver tailored expertise faster and easier to their clients. In the recent years, many researchers have described the gradual integration of digital technologies within the legal sector, and the future opportunities that such technologies could bring (Susskind and Susskind 2015). For clients, these changes create the opportunity to obtain more value for their money, while the unbundling of services improves transparency, allowing customers to conduct more informed choices. These and other changes have already introduced new actors, structures, practices, values and beliefs to the legal sector, challenging pre-existing practices, dominant business models and current organizational forms (Hinings et al., 2018; Smets et al., 2017).

Technological optimism, however, is not shared by all researchers in the field. The legal industry is a traditional industry with long-standing institutionalized practices (Empson, Cleaver, & Allen, 2013). Some scholars, while recording the integration of new technologies within the sector, expect law firms to be slower than others in terms of technological adaption (Gordon, Shackel, & Mark, 2012). Changes have taken place in traditional law firms, and will continue, albeit gradually, through the integration of "off-the-shelf" technology (Skjølsvik et al. 2018). The opportunity for cheaper, commoditized legal services, enabled by information technologies (Brivot, 2014), implies adaptation, but not necessarily disruption, of the dominant business models. As concluded by Kronblad (2020), restructuring of large law firms requires a profitability crisis: although the Great Recession has temporarily disrupted the US and UK legal sectors (Williams et al. 2015), on average the legal sector has enjoyed

profit margins unheard of in most other settings for decades now (Regan & Rohrer, 2021). In this context, digitalization can be a solution looking for a problem. The integration of digital technologies, however, could undermine the foundations of such unusual profitability, thus leading to the disruption of the sector: how digitalization is affecting and will affect the development of the legal sector remains an open question.

To better understand the relative merits of the innovation drivers leading the digitization of the legal sector, we have analyzed the recent innovation processes taking place within both incumbent traditional law firms and New Law firms in the Norwegian context. The choice of Norway as the empirical setting is meant to provide a counterpart to most of the existing studies, which are focused on Anglo-Saxon environments. Furthermore, Norway is of particular interest because two of the main drivers of change of the US law sectors, namely the profitability crisis brought by the Great Recession and the dissatisfaction among the workforce, are missing. At the same time, Norway boasts a highly digitalized economy, and a digital-savvy consumer base. Thus, the Norwegian context provides a natural setting for evaluating the relative importance of technological push factors vis-à-vis the above-mentioned socioeconomic factors in the context of digitization and related business model innovation processes. Our study finds that, while technological opportunities are being exploited, traditional business models remain dominant, with most business model innovation taking place within new firms dedicated to service either new or niche market segments, or to support the work of established law firms. At least in Norway, digitization of the law sector is proving complementary, not disruptive, helping incumbents to maintain both their very high profitability rates and their traditional partnership governance structures.

The article is organized as follows. After this introduction, section 2 describes the theoretical framework of reference informing the study. Section 3 describes the methods used in selecting the sample, structuring the data and analyzing the results. Section 4 presents and discusses the main findings. Section 5 concludes.

2. Theoretical framework

Organizational logics define practices while simultaneously providing meaning (Thornton & Ocasio, 2008) and legitimacy (Nigam & Ocasio, 2010). Logics emerge, are acted and constantly renegotiated in relations inside and outside the organization (Thornton, Ocasio, & Lounsbury, 2015). When behavior and practices reproduced collectively are repeated over time, logics becomes dominant (Thornton, Ocasio, & Lounsbury, 2015). Dominant firm logics are partially captured and reified by explicit business models (Teece, 2010), detailing how the firm's resources and activities are coordinated to achieve value creation, delivery and capture, (Ovans, 2015). Successful business model can be understood as generally accepted blueprints on how to operate within given contexts (Powell & Colyvas, 2008), providing individuals with information to plan, make sense of and legitimize their actions (Nigram & Ocacio, 2010). Thus, relations between individuals, organizations and the wider institutional context constantly re-create cohesive systems of norms and routines (Powell & Colyvas, 2008).

Research and practice concur that further integration of digital technologies with everyday legal work could offer great benefits to firms and customer alike (Skjølsvik et al., 2018). However, these opportunities can be effectively pursued only if their implementation can be harmonized with existing business models. The related process of organizational change is neither free of costs nor certain: neither the actual pattern taken by digitization, nor the scope of the disruption involved, can be determined *ex ante*. Therefore, it is reasonable to argue that identical technological opportunities will affect identical sectors in different ways, leading to different outcomes depending on contextual factors affecting the strength of the dominant business models in their roles of organizational and sectorial logic. Which factors are most relevant can be gauged from the historical development of the sector?

Large law firms emerged at the beginning of the twentieth century as a reaction to the failure of the previously dominant business model, the small equal partnership, to cope with the increased complexity of socioeconomic disputes. These new firms were organized hierarchically, with more experienced lawyers owning and managing the firm and younger practitioners working as employees, competing in an internal tournament for promotion to a partner position. The business model functioned well until the 1980s, when increased competition among firms and the growth of in-house counseling led large law firms to start losing revenue (Heineman, 2016). These competitive pressures created the need for higher compensations for the rainmakers, lawyers with key business contacts, leading to the development of profits-maximizing tactics. Exceptionally high *per-capita* dividends were secured by restricting the number of beneficiaries relative to the total workforce. In other words, profitability was achieved thanks to the increased ability to extract surplus value from junior associates working excessive

hours in exchange for the promise of a potential promotion in the future, a promise that for most will not be fulfilled (Maister 2012). The resulting pyramid model maximizes the efficient cat herding properties of profit sharing within a partner structure (von Nordenflycht, 2010) while simultaneously maximizing payoffs for those at the top of the structure.

While internal redistribution is secured by the partnership structure, revenues are generated by selling judgement-based advice with high-margin hourly rates for bundled services. The opaque quality of the output (von Nordenflycht, 2010) makes it difficult for the client lacking expertise in the field to assess the quality of the services provided (Løwendahl, 2005). In the assessment of service quality customers are forced to rely on other factors. Reputational elements, such as external appearances, public profile, known collaborators, track records, membership in professional associations, presence of explicit set of ethical rules, play an important role. High prices signal high value; consequently, prices are not set according to production costs, but rather as part of the market positioning strategy pursued by firms.

Such a strong profitable business model has also reduced incentives for law firms to prioritize cost-efficiency (Zettermark, 2012). Competition for top-university graduates led to starting salaries for newly minted lawyers skyrocketing, making first-year associates and their training a significant cost for their employers. Employers recoup training costs in the following years, as billable hours expectations for early-career associates chasing promotions are now up to 3000 hours per year Increasingly, firms have adopted, explicitly or implicitly, a “up or out” practice, meaning that associates are either on a promotion track, or encouraged to leave. The practice has further reinforced the dominant organization logic, by promoting individuals conforming to it (van Hootegem, Niesen, & De Witte, 2019).

In most industries, integration of digital technologies would be welcomed due to the associated efficiency gains, higher margins and accompanying competitive advantage. For business models centered on billable hours, however, less hours of work translate into lower income and revenues. Digitalization poses a significant challenge for law firms, as technological opportunities can be fully exploited only by revising their business models and practices to integrate new resources, pricing models and organizational routines (Teece, 2010). The resulting slow process of adaptation has created opportunities for new, “born digital” firms to enter the market, exploiting both technological and organizational advantages, created by the dominant business model followed by large law firms.

New Law firms’ business models are aiming towards market segmentation and extension opportunities created by the dominant business model (Williams et al. 2015). First, New Law firms move away from billable hours revenue generation models in favor of the sale of standardized solutions to the customers, at a fixed price, reducing reduced information asymmetry and opacity in favor of clients. By integrating digital technologies at the core of their operations, New Law firms can achieve significant cost reductions, offering very competitive prices and making legal services affordable for budget-constrained firms and households. Secondly, New Law firms can be based around managerial, rather than partnership-based, governance structures, limiting the amount of dividend payments expected every year, liberating resources for innovative investments and reducing the rate of exploitation of the junior workforce. This allows such firms to poach lawyers from traditional law firms after the latter have paid the significant costs involved in their training, a significant boon. Furthermore, New Law firms can pay relatively lower wages to their lawyers, as the other perks of the job make the loss an acceptable trade-off for many.

Thus, while the dominant business model appears both profitable and securely established, its very strengths create a potential competitive advantage for radically different new digital business models to emerge. While the new business models are at least in part predicated on the continued existence of traditional law firms, the relationship between old and new cannot be determined *a priori*. Is New Law complementary, and therefore useful for the continued survival and success of traditional but partially digitized law firms, or parasitic, and therefore a long-term threat to their profitability and success? Are large law firms seeking to integrate, emulate or outcompete the new entrants? What are the key contextual factors determining this relationship? To answer these and other related questions we turn to our empirical data.

3. Methods

We performed a cross-sectional survey in the form of semi-structured interviews with open-ended questions, consistently with our choice to generate high-quality data from a relatively small sample of respondents (Brinkmann & Kvale, 2015; Wengraf, 2001). Our sampling strategy aimed to achieve an extreme or intensive sample (Johannessen et al., 2011). To achieve this goal, we contacted eleven of the largest law firms with headquarters in Oslo, and four smaller companies generally considered particularly innovative in the field. In addition, we contacted two companies operating from outside Oslo, which were referred to by our informants as particularly innovative in their business models. We aimed to secure informants working as Managing Partners or equivalent, as we were interested in obtaining a general perspective on the companies' current and future business models, and their strategic approach in regard to digitization. Some New Law companies employed managerial personnel dedicated to overseeing the digital innovation strategy: in these cases, we prioritize these types of informant. Of the companies surveyed, we ended up interviewing nine companies (remaining companies were not available for interviews), all either Managing Partner or a top-level manager with innovation strategy responsibilities.

Table 1 below shows an overview of the firms that are established or startups. Note that Company H has launched its own startup (labelled H2).

Table 1: Firms surveyed

Company A	Traditional
Company B	New Law
Company C	New Law
Company D	New Law
Company E	Traditional
Company F	New Law
Company G	Traditional
Company H	Traditional
Company H2	New Law

To analyze the data, we first carried out open coding of the interview transcripts in order to identify first-order categories. We structured our findings by applying the innovation capabilities framework proposed by Lawson and Samson (2001). Following this preliminary categorization, we applied selective coding (Flick, 2009) to identify the sector-specific aspects of the ongoing digitization process. We performed this procedure iteratively, moving back and forth between codes and data until consensus among the researchers emerged.

4. Findings

After summarizing our findings from in-depth interviews in NVIVO, we have selected the most prominent factors for innovation capacity that were highlighted by the informants as existing in their respective firms. In the following, we summarize our findings for organizational capacity as proposed by Lawson and Samson (2001).

4.1 Vision and strategy

Most of the respondents, traditional and new, mention innovation as being one of the main goals of the firm, if not the most important. Being digital is almost always associated with the innovation strategy, as technological opportunities are perceived by every firm in our sample as both numerous and significant for the future development of business activities:

> *"The vision is to be the most digital, the lawyers who make the best use of technology. We want the company to be a frontrunner in using digital tools. To make us work much more efficiently even though it may go against our traditional business model with hourly billing and such"*
>
> *– Manager, Company A*

We see however a key a difference between traditional companies and New Law companies in this regard. The former has focused on the acquisition and integration of a suite of digital instruments within existing routines, gradually training employees to make use of the software to automatize the most routine aspects of their work. The latter have instead established their own innovation and digitization units, with dedicated developers and budget, in order to create and grow over time *ad hoc* digital instruments to be deployed as part of their core operations. Furthermore, digital development and innovation portfolios have been assigned to specific

employees with managerial responsibilities, to ensure consistent and rapid integration of new technological solutions across the whole organization.

4.2 Harnessing the competence base

Consistently with the different innovation strategies, different approaches have been taken in regard to the integration of technological competences within the firm. New Law firms have resorted to hiring technologists directly, in order to build in-house competence and development teams. While the core business remains the provision of legal services, and lawyers keep being deployed at the frontlines, the internal supporting organization is tech-based:

> *"We will not be specialists in technology, we will be specialists in our profession and the provision of legal services to our clients. And we will provide input on how our services should be related to the technology that is out in the market. You need to see a lawyer if you need legal advice. The same goes for technology - you have to go to the technologists"*
>
> *– Manager, Company C*

Traditional firms are more comfortable with working with external suppliers and developers, providing them with mature, ready to use solutions which are first bought and then gradually assimilated by the lawyers in the course of their work:

> *"For us, innovation is teamwork, both internally between us, but also input from suppliers and developers. And those who know the technological side much better. They come with input and suggestions, and new things. Then it is up to us to find out if it is value-creating for us or for customers."*
>
> *– Managing Partner, company E*

Some traditional firms tried to assign innovation mandates to some of their lawyers, to incentivize them to speed up the process of technological adoption. However, the billing hours logic, central for both revenue generation and promotions, prevent lawyers from spending time on innovation, as clients remain the number one priority.

4.3 Creativity and idea management

The law firms in our study are concerned with finding problem areas that can be streamlined using technology. Established companies have invested significant resources in the upgrading of their digital systems. For New Law firms, however, digital systems and solutions are the core business, with many of them being based around specific technological approaches to a niche segment of the market. Again, we find a significant divide between traditional and new firms. In the latter, development is constantly pursued by dedicated teams within the company. In the former, while some top-down initiatives are pursued to increase digitization, mostly through purchasing of externally provided solutions, contextual ambidextrous solutions are also pursued, with employees being encouraged to come up with ideas for improvement:

> *"The most important thing for all of us who work in company G is to think that we are renewing ourselves. We will not succeed in the future by doing exactly what we do today".*
>
> *– CEO, Company G*

At the same time, however, no incentive structure appears to exist for successful bottom-up innovation initiatives. Again, the dominant logic of billing hours appears to act as a barrier for innovation in traditional settings.

4.4 Organizational structure and systems

In the legal profession, bonuses are a well-known tool for stimulating employees. Four law firms pointed out that they accepted internal time, often used on innovation projects, as billable hours for the distribution of bonuses. However, all mentioned that the process of definition of such hours was still immature, with *ad hoc* solutions being implemented, creating a source of uncertainty. Client work remains the secure path for achieving promotions and yearly bonuses. As a result of these issues, two traditional firms have resorted to discretionary bonuses to be able to reward innovative employees directly. New law firms appear to prefer to arrange competitions internally to increase engagement around certain topics. In both cases, the bottleneck appears to

be lack of proper organizational routines rather than costs. In fact, abundant earnings are described, from an innovation perspective, as a hindrance rather than a boon:

> *"Earnings in the legal profession are still rising, law firms have never made as much money as now, there is no crisis in the industry. And no real incentives to become more effective as long as companies invoice on hourly rates."*
>
> *– CEO, Company D*

4.5 Culture and climate

The law firms in our study are all concerned with spreading and maintaining a culture that promotes innovation. Among other things, it has been stated that it is necessary for everyone in the company to have a continuous willingness to change and that what is good enough today is not necessarily good enough tomorrow. Despite all companies surveyed having innovation as a goal in their overall vision, only New Law firms had an explicit innovation strategy. Traditional law firms would rely instead of suggestions and marginal improvements being development in the course of ordinary work by employees.

> *"If you have a good idea and are an attorney, an assistant or a partner, you are allowed to try. And many of the ideas come from all over the place. Not just top down"*
>
> *– Managing Partner, firm H.*

New Law firms appear to be particularly critical of the partnership governance structure's ability to support innovation:

> *"The alternative to running a law firm is that is partner-owned. Partners are often the oldest in the company. They are concerned with getting a return on capital. They go as they say, 'naked in, naked out'. So, if an innovative force in the company is built that gives a return five years later, then it is not interesting for them. (…) as a corporation, we have long-term owners all along, never taken dividends - we build value by making the company robust."*
>
> ***– CEO, Company B***

4.6 Management of technology

Traditional law firms have already introduced a number of technological solutions to help with automation. Although some solutions are reported to work well, most tools remain underused. Several informants pointed out that many technological instruments are purchased without any concrete implementation and training plans, leaving their use to the lawyers' own initiative. As pointed out by one of the respondents:

> *"We have something called 'Digital Tools', where we have about 60 different digital solutions. It scares people a little, they ask: "should I really learn all this?". No, you are not supposed to learn all this, you are going to learn what is relevant to you"*
>
> *– Managing Partner, Company F*

Use of technological instrument is encouraged through the appointment of internal honorary titles, such as digital ambassadors, *ad-hoc* bonuses and other form of praise. Training programs are also being increasingly funded, in response to the relatively low rate of integration of new digital instruments.

5. Conclusions

Consistently with our theoretical framework, we find that, while ignoring technological opportunities is unthinkable in a competitive environment, both the pace and scope of technological change are affected by the effectiveness of current organizational routines. Furthermore, since business models are not only organizational-level artefacts, but sectorial logics, successful business model can tame disruptive technological trajectories within the entire sector, affecting not only the adaptive behavior of incumbents, but also the strategic decisions taken by new entrants. As traditional firms struggle to integrate digital technologies in their core business, New Law firms emerge to take advantage of new market niches, using the opportunities offered by the limitations of the dominant business model.

Established law firms are pursuing a long-term strategy of gradual transformation of their workforce; the goal appears to be a technology-savvy lawyer, able to both accrue billable hours with customers and autonomously

dedicate some internal hours to innovation development (Fenwick and Vermeulen 2019). This way, the savings in work hours obtained through digitalization can be converted into internal hours, maintaining the current high prices for the customer; as a result of these practices, the hours reported by each associate are becoming a less reliable indicator of the price the client is asked to pay (Brown and Lewis, 2011). Making lawyer autonomous in their choice of use of technological instruments also ensure that the billable hours entered by associates into their time sheets the time that they think their work is worth, an evaluation made on the basis of traditional, inherited standards. This creates an incentive for lawyers to make use of the technology, thus increasing their productivity, while simultaneously minimizing the share of productivity gains passed on to customers.

New Law firms are conscious of these practices, using them as a source of legitimacy for alternative pricing arrangements (Brivot et al 2014). These firms view standardization and commoditization as an opportunity to serve clients well, at a reasonable price, doing away with much of the opacity of traditional legal work. While these trends are shared between the Norwegian setting and much of the rest of the legal world, some peculiarities also emerge. Firstly, lack of profitability crisis among traditional law firms has made them particularly confident about their abilities to avoid any form of technological disruption: none of our informants manifested any worry regarding the competition

In conclusion, our study argues that ample technological opportunities are not sufficient in themselves to bring disruptive change in presence of profitable, legitimate, traditional business model. While innovation is happening, so far it has not significantly affected the bottom line of large law firms, and there are few signs that this may be the case in the future. Under these conditions, a complementary, rather than disruptive, configuration may emerge, with New Law firms taking the role of extending the market and providing key legal services to Big Law, allowing the latter partnership model to continue to thrive.

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eSmallFarmer: Improving of Rural Agriculture

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Abstract: The introduction of concepts such as IoT or cloud computing is increasingly common nowadays, in different sectors of activity where the agricultural sector is not an exception. The use of drones for pesticide application in pest control, or even the use of sensor networks to control the growth of crops, are quite common in the context of Agriculture 4.0. However, this technological advance does not happen at the same speed in remote regions where traditional agriculture is still dominant. These differences even contribute to increasing the gap between urban regions, where modernized agriculture predominates, and rural areas, are still strongly rooted in traditional agriculture. In addition to these technological differences, there are still major differences regarding access to market outlets, where the pandemic COVID-19 further aggravated the situation. Given the measures to contain the pandemic, which has resulted in the closure of virtually all services (for example, butchers and small markets), many of the small producers have been left without their only means of disposal, which has contributed strongly to the weakening of small agriculture. To mitigate the differences between the rural and urban areas, but also to mitigate the negative impacts caused by the pandemic COVID-19, the need for new livestock/business models was raised to create conditions to allow producers, in regions with low population density, access markets that until now were impossible. This paper presents a viable business model that contributes to reduce the differences between urban and rural environments, as well as, mitigate the economic impact of the COVID-19 pandemic in this sector.

Keywords: small producers, production flow, agriculture, internet of things, ecosystem, reuse

1. Introduction

Since the early times, the practice of agriculture has been common in society. As an activity that generates wealth, it's extremely important in several countries, including Portugal. Since agriculture is the main source of food production in the world, it's extremely important to develop this sector to reduce costs and increase profits by means of optimization of processes and technological innovation. By 2050, the human population is expected to rise to 10 billion, leading to an increasing demand for food (FAO, 2017). To accommodate this increasing evolution, total food production must increase, thus, making it necessary to have a rational expansion of the agricultural sector, which may occur at a slow or fast levels, depending on the capacity of the population in the acceptance of new technologies (FAO, 2016) (FOOD, O, 2016) (Powell, Nicola et al, 2012). However, despite the need for an expansion of the agricultural sector to tackle the problems mentioned above, Portugal is increasingly abandoning rural areas and inevitably abandoning rural agriculture, and is increasingly losing jobs in the agricultural sector (PORDATA, 2021).

Analysing figure 1, it's possible to observe that the Portuguese population is not distributed uniformly throughout the country, having a higher concentration in the coast than in the interior (a more rural zone).

Because of this variation in population, development is not carried out in a distributed and equitable way between urban and rural regions (European Union, 2021a).

Another important point can be observed in the figure 2, which is the percentage of the population that is older than 65 years old per municipality. As we can observe the majority of the municipalities that have an older population are located in the interior of the country.

Analysing these two facts we can conclude that the population that is living in the rural areas of Portugal is aging and decreasing, being two of the critical factors of the rural agriculture in Portugal. Another least favourable points of the rural agriculture in Portugal are low levels of education of agricultural producers (PORDATA, 2015), low level of adherence to technologies, and consequently, a lower connection with Industry 4.0.

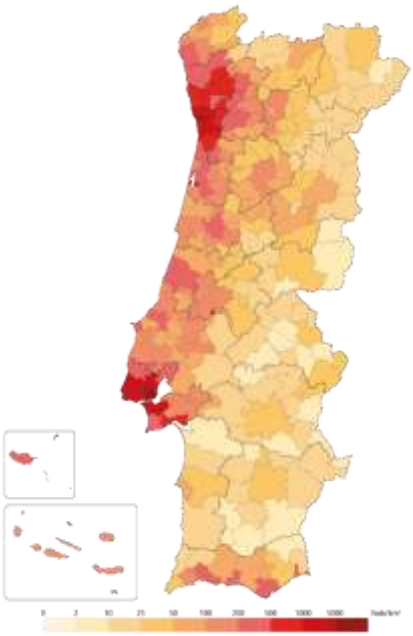

Figure 1: Portugal population density (Wikipedia, 2021)

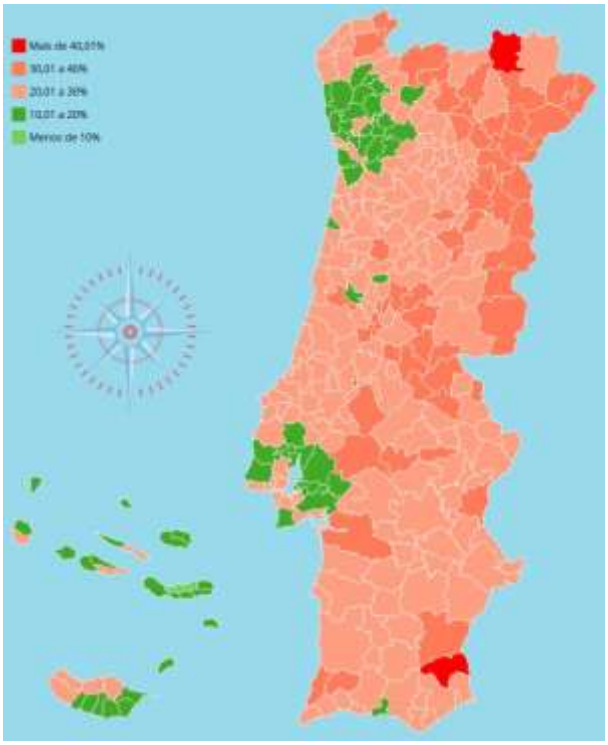

Figure 2: Percentage of Portuguese elderly population per municipality (Curvelo, 2020)

The Portuguese territory covers about 92,000 km² and maintains a population of near 10 million habitants, which despite being a small country, in 2019 has exported 6322 million euros in the agricultural sector. This value corresponds to about 7% of all national exportations in all sectors that year (European Union, 2021b). Of the 92,000 km², 79% corresponds to rural territory, showing its potential. However, only close to 31% of the population lives in these territories, against almost 47% living in the urban areas, showing the differences between the two geographic realities. Something important, is the Gross Value Added (GVA), which is the result of productive activity over a given period (European Union, 2019). It results from the difference between the value of output and the value of intermediate consumption. This value corresponds to 26.5% in rural territory, and increases to 54.1% in urban territory as illustrated in the figure 3.

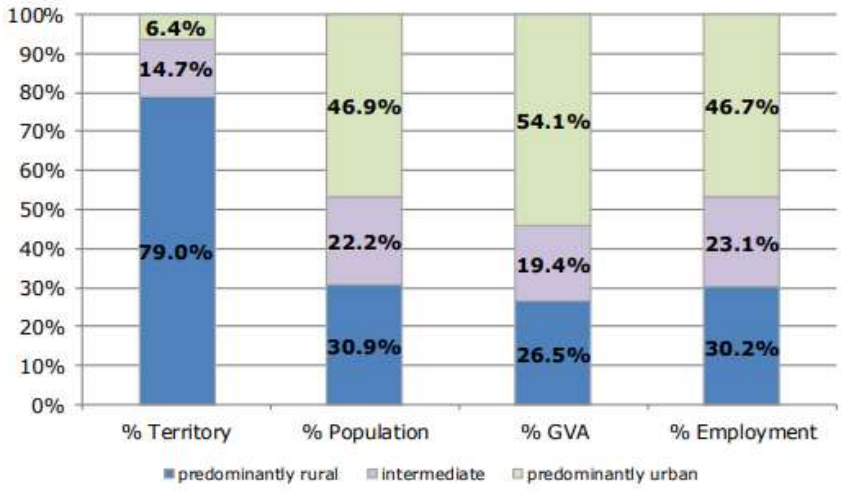

Figure 3: Portuguese distribution (European Union, 2021b)

Although Portugal having a huge rural territory, investing in the agricultural sector of these areas cannot simply be investing monetarily, there is a need to know how to analyse investment opportunities and how to apply them. Thus, the Portuguese agricultural sector needs to innovate and follow technological trends, and that can be accomplished by following the concept of agriculture 4.0. That concept consists of a set of technologies with the objective of optimizing agricultural resources, enabling the use of new, more accurate and modernized methods (De Clercq, M. et al, 2018). Some of these methods are:

- Drone technology - The method of using drones to perform agricultural tasks;
- Data analysis - The method of analysing raw data with the goal of extracting information;
- Internet of Things (IoT) - The concept of interconnectivity of objects with access to the internet (Ascensão, Joao et al, 2021).

These technologies have not been used in the *Trás-os-Montes* region due to the several reasons referred previously, however in this paper is presented a business model that follows the concept of the agriculture 4.0. The business model illustrated in this paper, contributes to reduce the differences between urban and rural environments, by means of a web platform, an IoT device, and integrations with several external entities.

The remainder paper is organized as follows: section 2 describes the *Trás-os-Montes* region and a questionary; section 3 presents the solution designed to respond to the identified problems; section 4 presents the conclusions of the work and guidelines for future work.

2. Trás-os-Montes region

Primary sector activities, such as agriculture, play a key role in the economy of *Trás-os-Montes* region. According to INE (2020) in 2019, *Trás-os-Montes* in the same year had the largest number of individual farms per region, with more than 63,000. In the same year, the value of agricultural production in Portugal exceeded 6.7 billion euros (Cordeiro de Sá, 2021), where this region contributed with 585 668 million (+- 8%). However, these values could be improved if not for the structure of this region, since it's practiced for an aging population, have high production costs, poor market relations, predominance of small agriculture, among others (Lima, n.d). Some of the aspects are partly related to the lack of agriculture 4.0, or the lack of solutions that could improve agriculture in some way (Norte2020, n.d).

However, the construction of solutions that solve part of the problems is no easy task, since in these regions, the use of internet, something common in modern solutions, is a critical point. Although 5G technology is already becoming a reality in several parts of the country, the *Trás-os-Montes* region still suffer from weak connections to the Internet (Lopes, 2018).

As for the disposal of agricultural products by the producers, this becomes a more difficult task, where in many cases, it's created food waste that could be avoided.

To help the development of this paper and the public in general to understand more specifically the theme, a questionary was developed to be answered by the locals of *Trás-os-Montes*. The questionary, until the moment, has more than 213 answers and it's still on going. Due to covid-19 pandemic, it wasn't possible to contact and personally ask people about this questionary, but it's expected, in a close future, to reach 3 or 4 times more the number of answers.

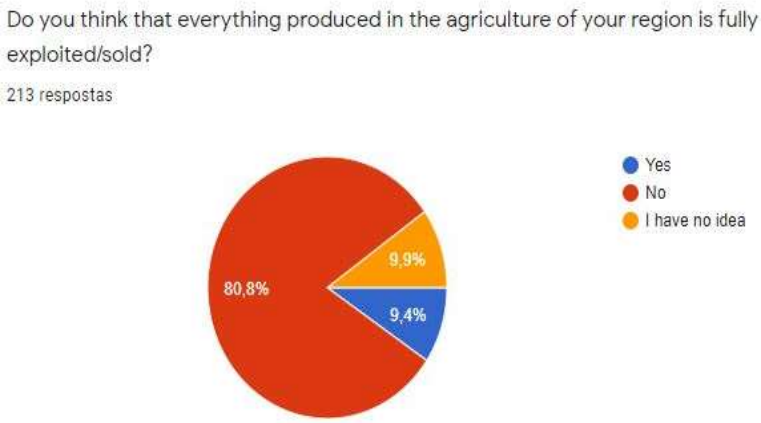

Figure 4: Questionary question #1

Observing the figure 4, people were asked if they thought that everything in the region is sold/used, and analysing the answers, its clearly visible that the majority tends to say no, with almost 81% of answers. The others 19% are divided between "Yes" and "I have no idea".

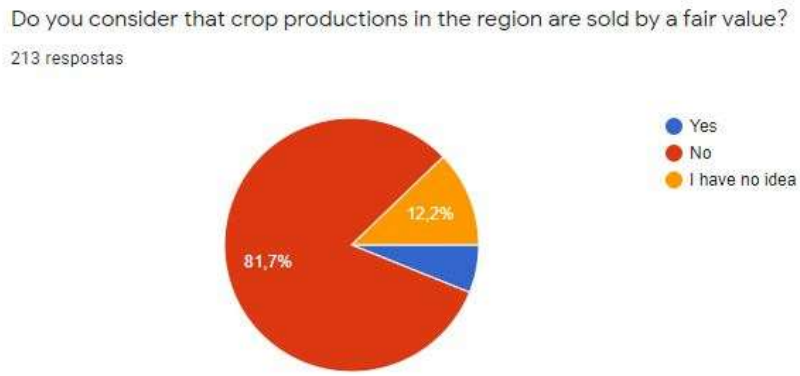

Figure 5: Questionary question #2

The figure 5, prompting the question "Do you consider the crop productions in the region are sold by a fair value?", had similar results to the previous one, since almost 82% answered it no. Near 18% are divided also between "Yes" and "I have no idea".

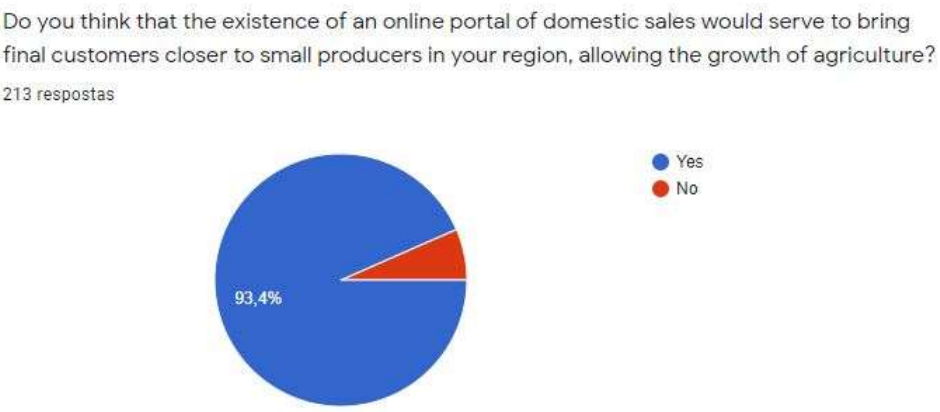

Figure 6: Questionary question #3

This last figure 6, show that more than 93% of the people inquired answered that the existence of a web national portal is needed, bringing consumers and producers close to each other, allowing the agriculture to increase.

With these questionary answers, it's possible to understand that the problems written previously, such as the waste of food and the need to producers sell their products, are very real and the society it's aware. Due to this, new solutions need to step up and try to solve some of the well-known problems, helping the people of *Trás-os-Montes*, and other regions in the same position, to be more efficient.

3. Our business model

In this way, eSmallFarmer (D. Pinto et al, 2020) can be a possible solution to mitigate the problems presented. This solution, in short, consists of a web platform and an IoT device. In addition, it has the integration of several entities such as governmental entities (e.g., parish council) and farmers associations, which play a very important role in the business model presented. The figure 7 presents an overview of the built business model.

The solution proposed is intended to facilitate the products sale of small-case producers in remote regions, such as the region under study. Thus, the design of the eSmallFarmer architecture considered the fact that, as already mentioned in the previous sections, the majority of the population in the region under study is aged, which sometimes, in the opinion of the authors, generally departs, the population of the use of technological solutions as presented in this paper.

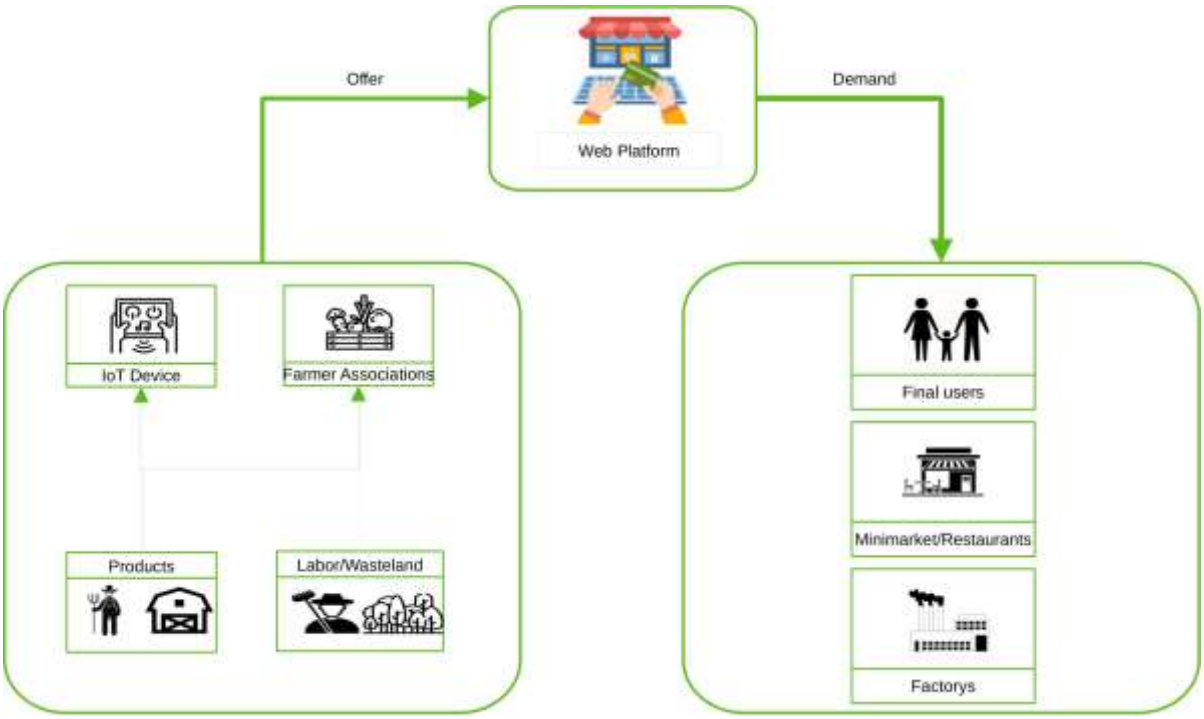

Figure 7: Business model

In this way, the possible problems that small producers may have in inserting their products directly into the web portal can be easily overcome with the acquisition of the IoT Device. This device, whose use is very similar to that of a telephone, connected to several sensors, allows the weighing of the products to be made available, in addition, can identify its producer, location and telephone contact. After the collection of this information, the product is automatically inserted into the web platform. However, this device uses NB-IoT to send data to the web platform, and this technology in some areas may not be available, since NB-IoT is a LPWAN and it needs to be connected to a cell tower to work (I-scoop, n.d). Thus, for these situations, the introduction of associations of farmers and/or governmental associations was the solution found to overcome the problem of limiting the NB-IoT network. These associations often have a good relationship of trust with small farmers and both computer resources (good Internet connection and computers) and human resources, which allows them to, at the request of small farmers, place their productions on the web platform.

In addition, this solution can contribute not only to boosting small production but also to solving the problem of labour shortages, another of the problems affecting agriculture in the region under study. So, in short, the web platform, makes it possible to promote the rental of human labour, agricultural machinery and land. In this way, end-users (both individual users, minimarkets and restaurants) have access to a set of high-quality products at a combined price. In parallel, factories that need agricultural material to make their products can look at this tool as an opportunity to explore new business models, since, as already said, the tool promotes the sale of products and leasing of land, making it possible to exploit it.

4. Conclusion

As described throughout this work, the *Trás-os-Montes* region faces problems that constraints its development when compared with urban areas. Such problems, as previously said, are based on the ageing population and the weak connection between the region and agriculture 4.0, including the limited use of internet.

This paper was written with the intention to let people know about eSmallFarmer. With it, it's possible to bring together farmers who do not have high knowledge in informatic areas, allowing them to sell their products more easily and effectively. eSmallFarmer counts with an IoT device and an e-commerce web portal.

Other advantages that can be obtained with this business model, includes the possible reduction of food waste, as well as a viable option in the case of this COVID-19 pandemic, which has accentuated the problems of small and medium-sized agriculture.

Another point that is present is the concept of circular economy, which is essential for a greener future (Ellen MacArthur Foundation, n.d). It is based on an idea of reduction, reuse, recovery and recycling of materials and energy. Through the solution proposed in this paper, it is possible to offer a cycle for producers that was once non-existent or made in a more difficult way. If we make available the farmer's products to general population, we tend to reduce the waste, reusing something that previously wasn't reused.

In case farmers start to observe their waste decreasing, abandoned fields can be reused, promoting their exploration by these farmers that now can sell more. This can also bring indirect advantages, such as reducing the probability of forest fires since these fields are now treated and monitored.

4.1 Future work

To future work, the main priority is to be able to build a prototype that is possible to install in a more realistic scenario. So, in summary form, despite the great potential presented, this solution still has a long way to go. Thus, the following points were left for future work:

- Study a possibility to reduce the Architecture complexity.
- Understand the real impact of controlling the food waste that this solution provides to producers.
- Present a study on the acceptance of this solution in the target regions.

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Economic Growth: The Role of Digitalization and Entrepreneurship

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Abstract: Research widely acknowledge that entrepreneurial activity is a driving force for economies. Recently, leading political institutions and scholars argue that digitalization is a central factor for economic growth and a fundamental right for citizens and societies. Moreover, studies have introduced the emergence "digital entrepreneurship" as a new research stream, to indicate an entrepreneurial process triggered by the infusion of new digital technologies in various aspects of entrepreneurship. However, research has often treated entrepreneurship and digitalization in isolation, partially neglecting a combined role as explanatory factors and driving forces for economic growth. To cope with this research gap, with this study, we aim at exploring how entrepreneurship and digitalization may impact economic growth. By employing a quantitative approach, we observe that entrepreneurship is positively related to economic growth and that digitalization mediates this relationship. Building on previous studies, we propose an original process model for measuring entrepreneurial activity made up of three phases, entrepreneurial quantity, quality and outcome. Findings show that only the last two phases of entrepreneurial quality and outcome have a positive impact on economic development. We believe that scholars can find interesting this research to further explore the role of digital entrepreneurship for economies and societies. Finally, policymakers can find useful our original method to measure the entrepreneurial activity and the impact that digitalization and entrepreneurship have on their economies.

Keywords: entrepreneurship, digitalization, digital entrepreneurship, economic growth

1. Introduction

Entrepreneurship, defined as "the pursuit of opportunity beyond resources you currently control" by Stevenson (1985, 1990, 1993), has been a prospering topic and central to the work of many scholars. The interest in this theme began at the beginning of the last century thanks to the Austrian economist Joseph Schumpeter who underlined the challenging nature of entrepreneurship towards the status quo. In more recent years, the trend of digitalization has become more and more relevant both from a business and a societal point of view. Entrepreneurship, like many other fields of knowledge, has been overwhelmed by this powerful revolution. Consequently, most existing studies have introduced the phrase "digital entrepreneurship", defined, "as the pursuit of opportunities based on the use of digital media and other information and communication technologies" (Davidson and Vaast 2010), to indicate the specific phenomenon triggered by the infusion of new digital technologies in various aspects of innovation and entrepreneurship. Furthermore, it is comprehensively acknowledged that entrepreneurial activity is one of the driving forces for a country's economic growth (Wong et al, 2005; Bjørnskov and Foss 2008). In the same way, also the level of digitalization positively affects economic development (Yousefi 2011; Stanley et al, 2018). However, a gap exists in the current state of the research since the economic growth of a country has never been explained by its level of entrepreneurship and simultaneously analyzing its level of digitalization. In this respect, we argue that the level of digitalization could mediate the effects of entrepreneurship on economic growth. In sum, we build a novel framework to examine the effects of entrepreneurial activity on economic growth, with a particular focus on the mediating role of digitalization (see Figure 1).

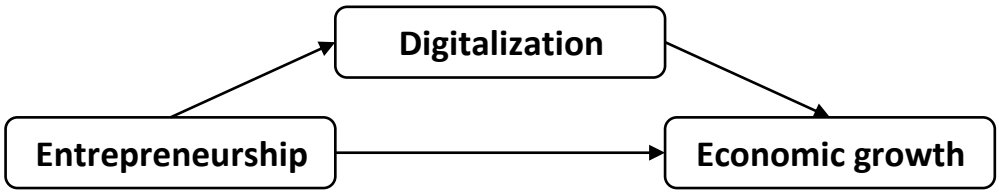

Figure 1: Research framework

Therefore, the aim of this research is to study the link between entrepreneurship and economic growth and to evaluate the role of digitalization in this relation. Through a quantitative approach based on a statistical model, we can state that entrepreneurship is positively related to economic growth and that digitalization completely mediates this relationship. Moreover, since we propose a process view of the entrepreneurial phenomenon made up of three phases, we state that only the last two phases out of three have a positive impact on economic

development. These refer to the phase of scale-up and stabilization of the firm. This research gives several contributions to the theory. First of all, the recent phenomenon of digital entrepreneurship is empirically proven. Then, a new and scrupulous way to measure the phenomenon of entrepreneurship is proposed. Policymakers can take advantage of this new method to measure the entrepreneurial phenomenon. Scholars can exploit this research to take a cue to analyze more in depth the relationship among these phenomena.

2. Theoretical background and hypothesis development

2.1 Entrepreneurship and economic growth

Entrepreneurship has been broadly studied by scholars and one of the main points of discussion about this field regards the relation between entrepreneurial activity and economic growth. Several authors in the last decades have debated about the impact of entrepreneurship on economic growth, both from a theoretical and empirical standpoint.

As far as the first one is concerned, since the publication of Schumpeter's study about entrepreneurship, entrepreneurs and their activities are believed to be relevant for economic development (Schumpeter 1934). As a matter of fact, the author states that entrepreneurs are "agents of creative destruction". However, growth itself has been at the heart of a heated debate for a long period, after the publication of Schumpeter's study. However, entrepreneurship has begun to be incorporated in growth models only in the last decades. Entrepreneurship is recognized to boost growth in several ways: guaranteeing efficiency, accelerating structural change, favouring amplified innovation (Acs and Audretsch 1988), enabling a greater variety of goods and services (Fritsch, 2008), increasing employment (Parker 2018), facilitating technology transfer and knowledge spill-overs from research to industry (Grimaldi et al, 2011). Although there are different ways to measure the entrepreneurial phenomenon and economic growth and scholars use distinct statistical methodologies, the broad consensus is that entrepreneurship leads to economic growth. For these reasons, we propose:

H1: The level of entrepreneurial activity is positively related to economic growth at country level

Then, compared to the empirical studies previously analyzed, we propose to model entrepreneurial activity as the combination of three entrepreneurial dynamics (Cavallo et al, 2020) and not as the set of context factors at the basis of the entrepreneurial ecosystem. Each of these dynamics refer to a specific phase in a start-up lifecycle (Kazanjian, 1988) which are, in order, the creation, the expansion and the stability. Hayward et al (2006) state that every phase of the entrepreneurial process should be examined by scholars. Consequently, taking advantage of the novelty of this approach, hypothesis 1 can be subdivided into three sub-hypotheses, each of which is related to an exact entrepreneurial dynamic. The latter, in accordance with the reference literature, is supposed to affect economic growth.

The first phase regards the creation of new firms and it is named "entrepreneurial quantity". Referring to Global Entrepreneurship Monitor, this phase embraces both necessity and opportunity entrepreneurship. Traditional measures of entrepreneurship in literature, such as self-employment and new-born companies, correspond to this description (Bjørnskov and Foss 2008). Accordingly, the following sub-hypothesis is proposed:

H1a: Entrepreneurial quantity positively affects economic growth at country level

The second phase regards the expansion of the firm and it is named "entrepreneurial quality". This phase is mostly typical of those firms that are characterized by opportunity and productive entrepreneurship. Some scholars like Stam (2015) argue that only this kind of entrepreneurship leads to economic growth. Numerically, the measurement of this dynamic is similar to the one proposed by Henrekson and Sanandaji (2013) which is the number of venture capital-backed firms or the VC investment as a share of GDP. Moreover, in this way we capture also the contribution to entrepreneurial activity given by already existing firms in addition to the new firms'. Thus, the following sub-hypothesis is proposed:

H1b: Entrepreneurial quality positively affects economic growth at country level

The third phase refers to the stability achieved by the start-up - which can be an IPO or a write-off - and it is named "entrepreneurial outcome". This step is exclusively achieved by high-growth firms. Several scholars such as Bjornskov and Foss (2016) highlight the importance of the outcome of the entrepreneurial activity, even if this theme has never been completely debated in an empirical way. On the other side, it is clear that narrowing the ecosystem to these kind of start-ups risks to not capture the whole picture. Therefore, the following sub-hypothesis is proposed:

H1c: Entrepreneurial outcome positively affects economic growth at country level

2.2 Entrepreneurship and digitalization

Sussan and Acs (2017) deeply analyze the role of entrepreneurship in the digital age by integrating the concepts of entrepreneurial ecosystem and digital ecosystem. An intense entrepreneurial activity is supposed to favour the development of a strong digital infrastructure. In addition, entrepreneurship has a fundamental role in facilitating the creation of new digital technologies and of reducing the associated costs. This allows the actors of the ecosystem - public administration, firms and citizens – to adopt this kind of technology in a broader way. Lower costs, in fact, guarantee a more extensive diffusion of the technologies. Thus, in doing so, the inevitable consequence is the increase of the level of digitalization within the ecosystem. For these reasons, we propose:

H2: The level of entrepreneurial activity is positively related to the level of digitalization at country level

Consistently with the first hypothesis and according to the conceptualization of entrepreneurship we propose, also this hypothesis can be split.

H2a: Entrepreneurial quantity positively affects the level of digitalization at country level

H2a: Entrepreneurial quality positively affects the level of digitalization at country level

H2a: Entrepreneurial outcome positively affects the level of digitalization at country level

2.3 Digitalization and economic growth

A very important stream of literature analyzes the impact of digitalization on economic growth. Digitalization refers to the impact of digital technologies at macro-level (of an organization, or a country): it can be defined as "the sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural" (Tilson et al, 2010). It is acknowledged that investment in Information and Communication Technologies and, in general, the exploitation of digital technologies in the service of business and society, favour economic expansion. (Stanley et al, 2018). Therefore, digitalization can be compared to entrepreneurship and can assume a similar role in growth models. Thus, we propose:

H3: The level of digitalization is positively related to economic growth at country level

2.4 Mediating role of digitalization

Nowadays digital technologies are quickly changing the societal and business environments. Scholars refer to this phenomenon as digital transformation. It is recognized that digital transformation reveals its effects in the entrepreneurial field (Nambisan et al, 2019). Therefore, the concept of digital entrepreneurship arises and gains relevance among scholars (Nambisan 2016). A gap exists in literature about the combined effects of entrepreneurship and digitalization on economic growth. At this regard, it is interesting to understand how digitalization fits in the relationship between entrepreneurship and economic growth. Integrating H2 and H3, we propose that the level of digitalization mediates the relation between the level of entrepreneurial activity and economic growth, i.e., entrepreneurship enhances digitalization, which in turn influences economic growth. Therefore, the following hypothesis is proposed:

H4: The level of digitalization mediates the relationship between entrepreneurship and economic growth at country level

Consistently with the first hypothesis and according to the conceptualization of entrepreneurial activity we propose, also this hypothesis is sub-divided in three sub-hypotheses:

H4a: The level of digitalization mediates the relationship between entrepreneurial quantity and economic growth at country level

H4b: The level of digitalization mediates the relationship between entrepreneurial quality and economic growth at country level

H4c: The level of digitalization mediates the relationship between entrepreneurial outcome and economic growth at country level

3. Methodology

3.1 Sample and data collection

To test the hypotheses, we collected data from several sources. The final longitudinal dataset includes data which refer to the 28 countries belonging to European Union in 2019 and with a time horizon that goes from 2009 to 2017.

We constructed a statistical model to evaluate the mediating effect of digitalization in the relation between entrepreneurial activity and economic growth. This causal model is based on mediation effect (Baron and Kenny 1986) and, more specifically, it is a multilevel mediation model because it is based on a clustered database (Krull and MacKinnon 2001). The research model includes an independent variable, which is entrepreneurship, a mediator variable, which is digitalization, a dependent variable, which is economic growth, and a control variable which represents institutions or quality of governance.

The database is necessary to measure the four variables of the model: entrepreneurship, digitalization, economic growth and institutions. Entrepreneurial activity is measured through the Entrepreneurial Index which is the arithmetic average of three components. Each component refers to one of the three entrepreneurial dynamics we already analyzed: entrepreneurial quantity, entrepreneurial quality and entrepreneurial outcome. Entrepreneurial quantity is simply calculated with the number of newborn firms divided by GDP at country level. Entrepreneurial quality is the arithmetic average – after normalization – among three indicators which track high growth companies and their abilities of attracting capital and, most importantly, attracting it in large quantities in order to scale their business models. The first one is the ratio between the amount of investment in start-ups and GDP. The second one is the ratio between the amount of investment greater than 5 million USD and GDP. The third one is the ratio between the number of big deals and GDP. Entrepreneurial outcome has the task of detecting the ability of a country to bring start-ups with high potential to a significant "size", which is manifested mainly through the achievement of an exit (Trade Sale or IPO) and/or particularly significant valorizations (greater than $ 1 billion - Unicorns). Specifically, two measures are used for this component. The first one is the ratio between the number of exits and GDP. The second one is the ratio between the number of the start-ups which become unicorns in a year and GDP. Entrepreneurial outcome, consequently, is the arithmetic average of these two indicators. Thus, entrepreneurship can be measured using the Entrepreneurial Index or, alternatively, one of its three components.

Digitalization is measured through a comprehensive framework elaborated by the observatory “Agenda Digitale” of Politecnico di Milano. The final result is a weighted average of four components that, similarly to the Entrepreneurial Index, compose this index. The four components of the Digital Maturity Index are Infrastructure, Public Administration, Citizens and Firms. Every component is a weighted average of many variables, gathered from different sources.

The dependent variable studied in the model measures economic growth. The variable chosen to evaluate the economic growth of a country is real GDP per capita. It is calculated by dividing GDP by a country’s population.

The last variable that has to be analyzed is the control variable. In this case an element to be used as control variable is the Quality of Governance which reflects the effectiveness of formal institutions within a country. The final indicator concerning the Quality of Governance is the arithmetic average of six components: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption.

4. Analysis and results

To test the model, we used a statistical software package named Stata. After having standardized each variable, we used an external Stata command to test mediation introduced in Krull and MacKinnon (2001), which is: ml_mediation, dv (Dependent variable) mv (Mediator) iv (Independent variable) l2id (country) cv (Control variables)

This command refers to mediation analysis, introduced by Baron and Kenny (1986). The logical structure is schematized in the following figure. Path c is called the total effect, path c’ is called the direct effect and paths a and b refer to the indirect effect.

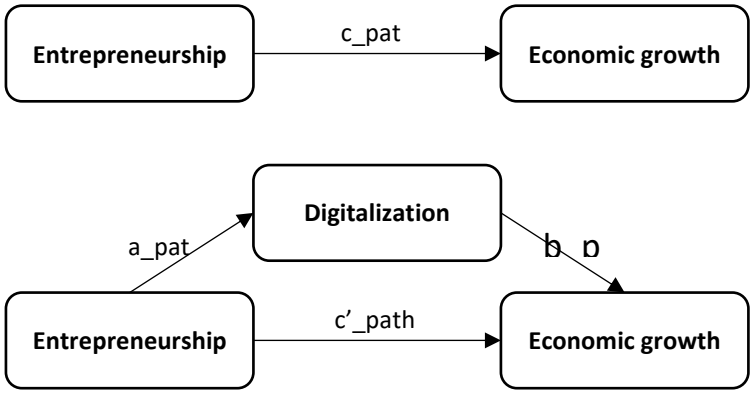

Figure 2: Mediational model

Then we evaluated the statistical significance of the effects through bootstrapping analysis. Given the fact that, according to literature, entrepreneurship and digitalization have an impact on economic growth only after 2/3 years (Carree and Thurik 2010), a two-year time-lag has been considered. So, entrepreneurship and digitalization in year *n*, as well as the Quality of Governance, are supposed to affect economic growth in year *n+2*. In the following table we can see an overview of the descriptive statistics of the variables composing the whole statistical model.

Table 1: Correlation Matrix; ***p < 0.001; **p < 0.01; *p < 0.05.

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1) Entrepreneurial Index	0.1079	0.0896	1											
2) Entrepreneurial Quantity	0.2223	0.2161	0.75***	1										
3) Entrepreneurial Quality	0.0687	0.1199	0.56***	-0.06	1									
4) Entrepreneurial Outcome	0.0421	0.0811	0.47***	-0.09	0.49***	1								
5) DMI Achieved Results	0.2838	0.1364	0.21*	-0.26*	0.51***	0.48***	1							
6) DMI_Infrastructure	0.3086	0.1388	0.23*	-0.18	0.47***	0.42***	0.92***	1						
7) DMI_Firms	0.2928	0.1521	0.16	-0.23*	0.42***	0.40***	0.91***	0.78***	1					
8) DMI_Citizens	0.2831	0.1358	0.18	-0.31**	0.52***	0.50***	0.98***	0.89***	0.84***	1				
9) DMI_PAs	0.2323	0.1530	0.20*	-0.24*	0.50***	0.46***	0.96***	0.86***	0.87***	0.94***	1			
10) GDP per Capita	24,820	15,833	-0.40***	-0.71***	0.23*	0.13	0.43***	0.31**	0.39***	0.48***	0.38***	1		
11) GDP Growth	1.1853	3.8744	0.30**	0.08	0.29**	0.26*	0.43***	0.47***	0.42***	0.40***	0.35**	0.10	1	
12) Quality of Governance	1.0471	0.4443	-0.23*	-0.53***	0.23*	0.16	0.36**	0.23*	0.38***	0.38***	0.35**	0.56***	0.04	1

Table 2: Statistical results; ***p < 0.001; **p < 0.01; *p < 0.05; standard errors in the parentheses

	c_path				a_path				b_path and c'			
	Economic growth				Digitalization				Economic growth			
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Control variable												
Quality of Governance	0.0474** (0.0146)	0.0633*** (0.0157)	0.0471** (0.0153)	0.0474** (0.0147)	0.2483** (0.0790)	0.1969** (0.0720)	0.1862** (0.0610)	0.1872** (0.0560)	0.0391** (0.0129)	0.0441** (0.0129)	0.0349** (0.0130)	0.0389** (0.0129)
Independent variables												
Entrepreneurial activity	0.0848*** (0.0175)				0.6181*** (0.0931)				0.0084 (0.0187)			
Entrepreneurial quantity		0.0323 (0.0283)				-0.1212 (0.0737)				0.0041 (0.0235)		
Entrepreneurial quality			0.0434** (0.0131)				0.4916*** (0.0752)				-0.0031 (0.0124)	
Entrepreneurial outcome				0.0831*** (0.0168)				0.8301*** (0.0684)				0.0165 (0.0173)
Mediator												
Digitalization									0.0797*** (0.0110)	0.0812*** (0.0090)	0.0837*** (0.0101)	0.0771*** (0.0106)

Table 3: Bootstrapping results; results are based on 5000 bootstrap samples

	Effect	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf. Interval]	
Entrepreneurial activity	Indirect effect	0.0589	0.0212	2.78	0.006	0.0173	0.1005
	Direct effect	0.0093	0.0116	0.80	0.422	-0.0134	0.0321
	Total effect	0.0683	0.0175	3.89	0.000	0.0339	0.1026
Entrepreneurial quality	Indirect effect	0.0461	0.0111	4.15	0.000	0.0243	0.0679
	Direct effect	0.0000	0.0084	0.00	0.997	-0.0164	0.0165
	Total effect	0.0462	0.0134	3.45	0.001	0.0200	0.0724
Entrepreneurial outcome	Indirect effect	0.0701	0.0319	2.20	0.028	0.0075	0.1327
	Direct effect	0.0178	0.0116	1.54	0.123	-0.0048	0.0405
	Total effect	0.0879	0.0355	2.48	0.013	0.0183	0.1575

Looking at the results of the statistical analysis which are reported in the table above, we can evaluate the validity of the hypothesis of this research. For the sake of clearness, following the logical procedure, we can analyse them by focusing on the entrepreneurial activity and on its three phases. For hypothesis 1, which is concerned with the effect of entrepreneurship on economic growth, and its related sub-hypothesis, we have to evaluate c_path which refers to the total effects. This is statistically and positively significant, in terms of p-value and coefficients, for total entrepreneurial activity, entrepreneurial quality and entrepreneurial outcome. The same does not apply to entrepreneurial quantity. Therefore, hypothesis 1, hypothesis 1b, hypothesis 1c are confirmed while hypothesis 1a is denied. For hypothesis 2, which is concerned with the effect of entrepreneurship on the level of digitalization at country level, and its related sub-hypothesis, we have to evaluate a_path which refers to a part of the indirect effects. This is statistically and positively significant, in terms of p-value and coefficients, for total entrepreneurial activity, entrepreneurial quality and entrepreneurial outcome. The same does not apply to entrepreneurial quantity. Therefore, hypothesis 2, hypothesis 2b, hypothesis 2c are confirmed while hypothesis 2a is denied. For hypothesis 3, which is concerned with the effect of digitalization on economic growth at country level, we have to evaluate b_path which refers to a part of the indirect effects. This is statistically and positively significant, in terms of p-value and coefficients. Therefore, hypothesis 2 is confirmed. Regarding hypothesis 4, which is concerned with the mediating role of digitalization in the relation between entrepreneurship and economic growth, and its related sub-hypothesis, a_path, b_path and c'_path have to be evaluated since they refer to indirect and direct effects. Given that there is no total effect between entrepreneurial quantity and economic growth, there is not even mediation. On the contrary, with respect to total entrepreneurial activity, entrepreneurial quality and entrepreneurial outcome, the results indicate that digitalization plays a role of mediator in the link between entrepreneurship and economic growth. Therefore, hypothesis 4, hypothesis 4b and hypothesis 4c are confirmed while hypothesis 4a is denied.

The analysis is supported by the results of a sensitivity analysis composed of three robustness checks. In the first one, economic growth, namely the dependent variable, is measured through GDP growth. In the second one, digitalization, namely the mediator, is measured through a component of the Digital Maturity Index that is the one about the degree of digitalization achieved by firms. In the third one, a shorter lag-time is considered in the relation between entrepreneurship and economic growth. Given the statistical results, all three confirm the validity of the model.

5. Discussion

The first main hypothesis of this research, namely hypothesis 1, is the one regarding the level of total entrepreneurial activity measured by the Entrepreneurial Index. The results obtained seem to be consistent with the reference literature. The results obtained suggest that entrepreneurial activity as a whole affects economic growth. Anyway, the three sub-hypotheses provide further details to be explored. In fact, hypothesis 1a, which refers to the relation between the first phase of the process and growth, is not supported by the statistical analysis. We define entrepreneurial quantity as the number of newborn firms divided by GDP. Our results indicate that the birth of more firms, which can enable both necessity and opportunity entrepreneurship, does not contribute to growth. Hypothesis 1b deals with the relation between entrepreneurial quality, which regards

the phase of start-up's development, and economic growth. This hypothesis is confirmed by the statistical analysis. By measuring the investment in startups, we focus on high-growth companies because entrepreneurial quality is typical of those firms that are in a phase of scale-up. This measure includes also already existing firms unlike the quantity-based one. This kind of measurement can be associated to some methods used by other authors who come to the same conclusion (Urbano and Aparicio 2016). Our analysis confirms his thesis according to which the main cause of economic growth, among entrepreneurial phases, is productive entrepreneurship, intended as high-growth entrepreneurship. Hypothesis 1c, which is supported by the analysis, refers to the outcome of the entrepreneurial process in terms of creation of exits by start-ups and unicorns. Thus, it is focused on a small elite of high-growth firms, whose establishment should, according to the results, impacts growth. Acs et al (2014) underline the necessity to study the outcome of the entrepreneurial process and our attempt tries to solve this gap. In fact, recently, a lot of attention has been paid about this topic to such an extent that the Kauffman Index itself has been changed to focus on this theme.

The confirmation of hypothesis 2 suggests that the level of entrepreneurial activity positively influences the level of digitalization at country level. Therefore, entrepreneurship has a positive effect in enhancing the diffusion and the adoption of digital technologies among citizens, firms and public administration. Moreover, it is confirmed that entrepreneurs have a key role in developing and digitizing the actual infrastructures. These concepts apply also to entrepreneurial quality and entrepreneurial outcome but not to entrepreneurial quantity, meaning that productive and high-growth entrepreneurship are the real facilitators of digitalization.

Hypothesis 3 is confirmed, and this indicates that the level of digitalization positively affects a country's economic growth.

The last hypothesis of this research is the one regarding the mediating effect of digitalization in the relation between entrepreneurial activity and economic growth. The statistical results coming from the multilevel mediation analysis and bootstrapping suggest that the hypothesis 2 is confirmed and that the relation among these variables is a full mediation. This confirmation has some very important implications if we consider the current state of knowledge in the field of entrepreneurship. First of all, it empirically confirms that the trend of digital transformation has been influencing entrepreneurship for several years. This has been possible thanks to the advent of powerful and pervasive digital technologies (Nambisan et al, 2019) which can manifest in the form of digital artifacts, platforms and infrastructure (Nambisan 2016). Entrepreneurship, in fact, is becoming more and more digital, demonstrating that the phrase "digital entrepreneurship" has not to be considered as a novelty anymore. Digitalization can be seen as the transmission mechanism from entrepreneurship to economic growth. Digital entrepreneurship can boost economic growth through a stronger acceleration of companies' structural change which is a needed factor to face the current competitive environment. Digital entrepreneurship is a facilitator of digital innovation which, in turn, leads to economic growth. Hypothesis 4a, given the fact that there is no total effect between entrepreneurial quantity and economic growth is denied. On the contrary we found statistical evidence for hypothesis 4b which is concerned with entrepreneurial quality. This indicates that high-growth start-ups, which are able to achieve a scale-up phase, are the main enablers of an all-round process of digitalization. Finally, hypothesis 4c, which deals with the outcome of the entrepreneurial process, is found proved according to the results. This means that the creation of start-ups capable of successfully achieving this stage (i.e. exit of unicorn) enhances to a greater extent a digital development of the ecosystem and consequently economic growth.

6. Conclusion

The aim of this study was to assess the link between entrepreneurial activity and economic growth and to evaluate the role of digitalization in this relation. We have tested a multilevel mediational model applied to a longitudinal dataset whose data refer to 28 countries belonging to European Union in 2019 and to a time horizon which goes from 2009 to 2017. The statistical results indicate the existence of a positive relation between entrepreneurial activity and economic growth and, moreover, they suggest that digitalization assumes a mediating role in this relationship. Thus, entrepreneurship as a process, contributes to economic growth and we can give a quantitative support to the almost completely established trend of digital entrepreneurship. Another contribution regards the new system developed to measure entrepreneurship. The latter has always been a critical issue in the empirical entrepreneurial studies. Several scholars have tried to provide a simplistic measure of the phenomenon, which despite being immediate and easy to elaborate, does not capture the whole picture. Given this criticality, we propose a new method to quantify entrepreneurship. This is performed through the

Entrepreneurial Index which has the merit and the advantage of having a process view of the phenomenon. In fact, all the three steps of the entrepreneurial activity are encompassed in this index: entrepreneurial quantity, entrepreneurial quality and entrepreneurial outcome. Moreover, given its focus on digital and high growth start-ups, it responds to the need of having a measure that takes into account the digital transformation trend (Acs et al, 2014). GEDI, in fact, will be reviewed and changed to adapt to this revolution. Entrepreneurial quality and entrepreneurial outcome are statistically proven to be the only enablers of economic growth through the mediation of digitalization. This a very important finding because it suggests that the digital entrepreneurship affecting economic development is the one related to the Schumpeterian concept. Thus, only productive digital entrepreneurship, which is the one that has the merit to exploit high growth potential opportunities, is positively correlated with economic growth.

This study has two potential practical implication. First, policymakers can exploit this new approach to measure entrepreneurial activity, modifying it at their convenience if it is necessary. Second, policymakers and entrepreneurs should be aware that, in order to favor a process of economic development, attention should be focused on high-growth and digital start-ups, according to the results obtained.

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Employee's Innovation Orientation From an Employer Attractiveness Perspective

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Abstract: The limited supply of innovative candidates, together with a high labor mobility, leads to high costs for recruiting, selecting, and retaining employees. There is no doubt that attractive companies can better attract and retain innovative employees, but whether the employer's attractiveness also leads to a higher degree of employees' innovation ability has not yet been clarified. Therefore, this study aims to identify the influence of employer attractiveness dimensions on employees' innovation orientation. Data for this study were obtained with the survey conducted on 491 randomly selected employees of four Slovak largest fuel retail sellers. Multiple linear regression was used to determine independent variables to help explain the response. It turns out that among the most critical factors influencing the employer's attractiveness belong customer orientation of the organization (Mean=3.04, SD=1.03), on the other hand, the least important factor is to have a good relationship with superiors (Mean=1.73, SD=0.94). Innovative employee orientation (EIO) manifests itself mainly in active search for new ideas and innovations in product/service development (Mean=2.92, SD=1.05). The constructed model also revealed significant relationships between employer attractiveness and employees' innovation orientation (p-value < 0.0001). Specifically, we found that individual employer attractiveness dimensions contribute for every 1% increase of the employees' innovation orientation in the order as follows: Application Value (0.2213%, p-value <0.0001), Interest Value (0.2069%, p-value < 0.0001), Development Value (0.1505%, p-value <0.0001), Social Value (0.1157%, p-value = 0.0020) and Economic Value (0.1063%, p-value = 0.0096). The study extends the research into employee innovation orientation, with empirical validation of the models showing the mechanisms and conditions through which the selected variables affect employee innovation orientation. It also presents a practical way of measuring employee's innovation orientation and the possibilities for its increasing. Therefore, findings also might help with building up a target group-specific employer brand. The conclusion also offers research limitations and suggestions for future research.

Keywords: innovation orientation, employees, HRM, employer attractiveness, fuel retail sellers

1. Introduction

Innovation is the key to maintaining the performance and competitiveness of modern companies (Remdisch et al., 2015, Baregheh et al., 2012). Attracting and retaining the most talented employees, motivating them toward generating new ideas and innovations is crucial for organizational success and survival (Van Hoye et al., 2013, Rozsa and Machova, 2020, Bejtkovsky et al., 2018, Belas et al., 2018) a fundamental challenge for most firms (Gambeta et al., 2019). Paradoxically, it is companies perceived as innovative that often appear more attractive to employees in general and to those with a special innovative personality (Sommer et al., 2017). Equally important as an innovative role appears to be the ability of companies to spread the image of their innovativeness and thus the ability to build and spread the brand of an innovative employer. For this reason, companies are also increasingly communicating their global talent management programs through their websites or job advertisements (Pekerşen & Tugay, 2020, Ewerlin, 2013, Szeiner et al., 2020). The reason is also the fact that organizations are better differentiated from each other based on symbolic image dimensions (innovativeness) than based on instrumental dimensions (Van Hoye et al., 2013).

Large and growing empirical literature examines the factors that increase companies' tendency to innovate and the intensity of innovation (Amara et al., 2016, Virglerova, 2018). The human factor in innovation activities at the firm-level in developing countries has received less attention in the literature. This study aims to identify the influence of employer attractiveness dimensions on employees' innovation orientation to address the mentioned research gap.

The paper has the following structure. Firstly, it discusses the literature on innovation in job search and its connection to the employer attractiveness. This is followed by the methodology section that explains the research context, as well as the ways of variables operationalization, methods of data collection and analysis.

A discussion on the results and implications for science and practice will then be presented. Finally, the paper concludes with suggestions for future research directions.

2. Theoretical background

Growing attention is being paid to innovation as a key success factor in a firm's sustainable competitive advantage (Rhee et al., 2010). Much effort has already been made to operationalize innovation in order to find the best definition and the factors that influence it (Ab. Majid and Awang, 2016). Referring to previous research efforts, we consider innovativeness as a feature that reflects its ability and capacity to undertake and support new ideas, practice and processes that might generate innovative products, services or processes (Du et al., 2016, Rhee et al., 2010, Filser et al., 2018, Riivari and Lämsä, 2019, Palumbo and Manna, 2018, Amiri et al., 2017) or at least the capacity to make full use of the organization´s creativity resources (Gritti and Leoni, 2012). In general, however, innovativeness is a decisive factor in organizations, but it should be noted here that having innovativeness in the organization may not necessarily always lead to new or sustainable innovations (Riivari and Lämsä, 2019). Nevertheless, organizational innovativeness is considered to be the company's "core competency" to offer superior customer value by innovating or renovating products or services (Tang et al., 2013, Jalilvand, 2017). Furthermore, a firm's innovativeness also significantly affects the symbolic brand benefits and the partnership value (Kim et al., 2015; Mura et al., 2019).

The development of new ideas and initiatives use begins at the individual level. Thus, organizational innovativeness requires people who can collaborate, share and integrate their knowledge and expertise (Riivari and Lämsä, 2019) and strong innovation culture (Sommer et al., 2017).

Employer attractiveness has been operationalized and repeatedly measured in different ways (Rozsa et al., 2019), for instance, as the expected benefits that a potential employee may receive while working for a particular organization (Berthon et al., 2005), as an attitude or view of the organization entity with which employee wants to establish a relationship (Aiman-Smith et al., 2001) or as the extent to which potential candidates favor the organization as good places to work (Jiang et al., 2011). The employer's attractiveness is a vital issue for organizations, as it affects its further functioning, namely the ability to address and attract suitable candidates and transform them into employees and retain them (Šnýdrová et al., 2019).

The research results show that organizations with a strong innovation culture appear more attractive to potential employees because innovation has a positive impact on the brand image (Amiri et al., 2017). These effects turned out to be even stronger for highly innovative employees as they care significantly interested in the company's organizational innovativeness (Sommer et al., 2017). Potential employees with a high level of innovative behavior are attracted, for example, by start-ups, which are stereotypically perceived as highly innovative and appreciate the innovative work of employees (Moser et al., 2017). In this context, it should also be emphasized that, for example, innovative university graduates are employed faster than their colleagues (Pilav-Velic et al., 2020). Finally, the results also provide arguments for a reconsideration of the role of innovativeness in the attraction of talents, which might be different and less influential than expected (Glanzmann and Moberg, 2020).

3. Research objective, methodology, and data

This study aims to identify the influence of employer attractiveness dimensions on employees' innovation orientation. The hypotheses were formulated as follows:

- H1: The Interest Value (IV) as employer attractiveness' component significantly contributes to the employees' Innovation Value Orientation (IVO).
- H2: The Social Value (SV) as employer attractiveness' component significantly contributes to the employees' Innovation Value Orientation (IVO).
- H3: The Application Value (AV) as employer attractiveness' component significantly contributes to the employees' Innovation Value Orientation (IVO).
- H4: The Economic Value (EV) as employer attractiveness' component significantly contributes to the employees' Innovation Value Orientation (IVO).
- H5: The Development Value (DV) as employer attractiveness' component significantly contributes to the employees' Innovation Value Orientation (IVO).

The research population consisted of the four largest fuel retail sellers' employees (Benzinol Slovakia, OMV Slovensko, Shell Slovakia, Slovnaft) in the Slovak republic. Firstly, Slovakia's gas stations were identified using

Google Maps. Secondly, Phantombuster.com was used to extract the data from Google Maps automatically. Thirdly, an MS Excel generator of random numbers was used to select research participants (a specific gas station). Fourthly, the survey was conducted on selected gas station employees using a paper and pencil questionnaire distributed by hired interviewers. The total number of completed questionnaires was 491, with an 8.4 % response rate. Data were collected during November 2020. Detailed characteristics of the sample are presented in Table 1.

The fuel retail was chosen because it was one of the few retail areas rather slightly affected by the Covid-19 pandemic measures at the research time.

Table 1: Sample characteristics

Analysis Columns	**Man**		**Woman**	
Generation	**N**	**% of Total**	**N**	**% of Total**
Generation X	170	34.62%	112	22.81%
Millennials	52	10.59%	54	11.00%
Generation Z	54	11.00%	49	9.98%
Education				
High school	225	45.82%	186	37.88%
University	51	10.39%	29	5.91%
Job level position				
Non-managerial level	146	29.74%	134	27.29%
Lower-level management	114	23.22%	56	11.41%
Middle and top-level management	16	3.26%	25	5.09%
Customer contact level				
No customer contact	24	4.89%	13	2.65%
Partial customer contact	128	26.07%	83	16.90%
Direct customer contact	124	25.25%	119	24.24%

(Source: author's calculations)

Reis and Braga's (2016) Employer attractiveness scale was used to measure study's independent variables as follows: Interest Value (IV): a challenging and stimulating job; Social Value (SV): positive and pleasant social and interpersonal environment; Application Value (AV): opportunity to apply expertise and convey knowledge to others; Economic Value (EV): above-average wages, compensations package, job security, and promotion opportunities; Development Value (DV): provides recognition, self-worth and confidence, the development of skills and career-enhancing experience.

The results showed high internal reliability of the scale (Cronbach alpha = 0.86), although some components' internal consistency was weaker (SV Cronbach alpha = 0.56, EV Cronbach alpha = 0.55). The individual scale statements and results are presented in Table 2.

The dependent variable, employees' innovation orientation (EIO), was measured with part of Dobni's (2008) Innovation culture scale. Specifically, the dimension that evaluates employees' value orientation, the degree to which employees are focused on and involved in creating value for customers, was used. The results are presented in Table 3. Scale showed high internal reliability (Cronbach alpha = 0.73).

For each of the items, a five-point Likert scale was used enabling respondents to indicate the degree or extent to which they had adopted the described behavior. Additional questions addressing information on gender, generation group, job level position and customer contact level were added.

Because the research took place in a non-English-speaking country, the questions were translated into Slovak and verified in a pilot study before the research itself. Some revisions to the translation have been made based on the pilot study results.

Multiple linear regression was used to determine which independent variables explain the response. Before the model construction, multiple linear regression assumptions were verified with the following conclusions. The linear relationship between the independent variable (EIO) and dependent variables (IV, SV, AV, EV, DV) was confirmed. Errors between the observed and predicted values were normally distributed. Variance inflation factors (VIF) were computed and there was no collinearity in the data. There was no clear pattern in the residuals' distribution, and thus, the homoscedasticity assumption was met. The least-squares approach was used to estimate the values of the model coefficients. All calculations were performed in SAS JMP version 15.

4. Results and discussion

The means, standard deviations, and Cronbach's Alpha values for all variables are reported in Table 2 and 3. It turns out that among the most critical factors influencing the attractiveness of the employer belong the customer orientation of the organization (Mean=3.04, SD=1.03), an above-average basic salary (Mean=2.79, SD=1.02), and acceptance and belonging (Mean=2.72, SD=1.02). On the other hand, the least important factor is a good relationship with superiors (Mean=1.73, SD=0.94).

Table 2: Employer attractiveness scale results

Analysis Columns	Mean	Std Dev	Cronbach alpha
Interest Value (IV)			**0.79**
Working in a vibrant/challenging environment	2.35	1.01	
Innovative employer - novel work practices/forward-thinking	2.58	1.12	
The organization both values and makes use of your creativity	2.34	1.13	
The organization produces high-quality products and services	2.30	1.03	
The organization produces innovative products and services	2.17	0.97	
Social Value (SV)			0.56
Having a good relationship with your colleagues	2.13	0.98	
Having a good relationship with your superiors	1.73	0.94	
Supportive and encouraging colleagues	2.63	1.28	
Happy work environment	2.04	1.00	
Application Value (AV)			0.71
Humanitarian organization - gives back to society	2.33	0.98	
Opportunity to apply what was learned in college/university	2.56	1.00	
Opportunity to teach others what you have learned	2.02	0.92	
Acceptance and belonging	2.72	1.02	
The organization is customer-oriented	3.04	1.03	
Economic Value (EV)			0.55
Good promotion opportunities within the organization	2.17	0.95	
An above average basic salary	2.79	1.02	
An attractive overall compensation package	2.38	0.91	
Development Value (DV)			0.66
Feeling more self-confident as a result of working for a particular organization	2.77	0.93	
Feeling good about yourself as a result of working for a particular organization	2.66	0.98	
Gaining career-enhancing experience	2.93	1.07	
Entire Set			0.86

(Source: author's calculations)

Innovative employee orientation (EIO) manifests itself mainly in an active search for new ideas and innovations in all phases of product/service development (Mean=2.92, SD=1.05) and at least in obtaining the information needed to make value-added decisions (Mean=2.23, SD=0.99).

Table 3: The employees' innovation orientation (EIO) results

Analysis Columns	Mean	Std Dev	Cronbach alpha
Innovation Value Orientation (IVO)			**0.73**
We co-define value with our customers	2.38	0.97	
In an attempt to create value, we proactively interact with others in the value chain (i.e. retailers, distributors, suppliers)	2.62	1.12	
There is a consensus amongst employees about what creates value for customers/stakeholders	2.31	1.00	
I actively search for new ideas and innovations at all stages of product/service development	2.92	1.05	
I get the information we need to make value added decisions	2.23	0.99	
I understand what systems/processes we must excel at to deliver customers/stakeholder value	2.47	0.95	
I have the freedom to develop the appropriate responses in efforts to create value for our clients	2.52	1.04	

(Source: author's calculations)

To verify the formulated hypotheses, a model with all predictors was compiled. The model showed that all independent variables had a significant impact on employees' innovation orientation (EIO), and thus all hypotheses can be accepted. As the Table 4 presents, the dependent variable's proportion explained by independent variables in a regression model is 0.528573. According to the presented model, the most important factor affecting employees' innovation orientation (EIO) is the Application Value (coefficient estimation = 0.2213, p-value <0.0001), the least important factor is the Economic Value (coefficient estimation = 0.1063, p-value = 0,0096). Moreover, all the researched factors positively impact the employees' innovation orientation (IVO), and thus all the hypotheses (H1 – H5) are confirmed.

Table 4: Multiple linear regression model

Term	ERC	Std Error	t Ratio	Prob>|t|	VIF
Intercept	0.5221737	0.087736	5.95	<.0001	
Interest Value	0.2068953	0.034892	5.93	<.0001	1.8465065
Social Value	0.1156574	0.037176	3.11	0.002	1.7395592
Application value	0.2212586	0.04746	4.66	<.0001	2.683353
Economic Value	0.1062978	0.040905945	2.6	0,0096	2.135160078
Development Value	0.1504564	0.036556712	4.12	<,0001	2.05328587
RSquare	0.528573				
RSquare Adjusted	0.523713				
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Ratio**	**Prob > F**
Model	5	102.06827	20.4137	108.7583	<.0001
Error	485	91.03327	0.1877		
C. Total	490	193.10154			

Notes: ERC = Estimated Regression Coefficients, VIF = Variance Inflation Factors, DF = Degrees of Freedom, C. Total = Corrected Total

(Source: author's calculations)

The presented results confirm the previous knowledge. Firstly, the employees' innovation orientation (EIO) is affected mainly by an environment enabling the application of expertise and the transfer of knowledge and also offers a challenging and stimulating job (Application Value (AV) and Interest Value (IV)) or in other words, with an innovation-oriented environment or organizational culture (Schuldt and Gomes, 2020, Zhou et al., 2005, Dabić et al., 2021, Simpson et al., 2006). Undoubtedly, the way in which employees are treated by managers also plays and important role (Development Value (DV)). For instance, scholars have found that active and charismatic leadership has a substantial and significant positive impact on employees' innovation orientation (EIO) (Zhou et al., 2005, Ryan and Tipu, 2013). Secondly, incentive payments or flexible working time

management practices and, thus the Economic Value (EV), show only minor effects on employees' innovation orientation (EIO) (Arvanitis et al., 2016).

However, this study also provides several implications for human resource management theory and practice. At the theoretical level, it proposes a model showing the mechanisms and conditions through which the selected variables affect employee innovation orientation, covering the existing research gap in the field of employee innovation orientation. At the same time, at the practical level, it draws managers' attention to the areas they have to deal with if they want to acquire and retain talented employees or build up a target group-specific employer brand and presents a practical way to measuring the levels of employee's innovation orientation.

5. Conclusion

Employer branding aims to present a seductive image to current and potential employees (Backhaus, 2016). A robust and resilient employer brand helps to compete for a high-quality workforce (Kapuściński et al., 2021) and also encourages existing employees to stay (Bakanauskiene et al., 2017), which is essential in the 'War for talents' times (Sommer et al., 2017). Although not entirely sure how much companies should invest in competing for a high-quality workforce and the potential adverse consequences from over-investing in such activities (Gambeta et al., 2019, Dvorsky et al., 2020, Kapuściński et al., 2021), the study results show that the employer attractiveness also influences employees' innovation orientation.

The study showed that the most critical factor influencing the employer's attractiveness in the fuel sector's companies is the customer orientation of the organization (Mean=3.04, SD=1.03). The innovative employee orientation (EIO) manifested itself mainly in an active search for new ideas and innovations in product/service development (Mean=2.92, SD=1.05).

The presented model confirmed that all five selected variables positively contribute to explaining the variance of the employees' innovation orientation (EIO). However, the innovative orientation of employees (EIO) is influenced mainly by the ability to apply expertise and transfer of knowledge to the others (Application Value (AV)). On the other hand, wages, compensation packages, job security, and promotion opportunities (economic value (EV)) influence the innovative orientation of employees (EIO) at least.

The following research limitations influence the achieved results. Due to the retail fuel sector's choice as a research sample, it is not entirely certain whether it can be generalized to the whole retail sector. It is also uncertain how the achieved results were affected by the COVID-19 pandemic crisis, particularly respondents' fear of losing their jobs during the crisis times and the consequent efforts to improve their image. The responses might also be inaccurate because of a respondent's misunderstanding.

Further research should focus primarily on research constraints but should also address the "dual" role of the employer brand attractiveness, which attracts talented employees and at the same time stimulates their innovation.

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Triple Helix Model in Practice: A Case Study of Collaboration in University Outreach for Innovation Development in Local Farming Community Enterprise in the Northeast Region of Thailand

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Abstract: This research project is an empirical case study from Thailand. The research aims to provide empirical evidence of how innovation development in a local farming community enterprise is promoted through knowledge exchange collaboration by the local university and public authorities. This form of tri-lateral partnership is known as the triple helix model of collaboration. The empirical case setting was a single-site case study bounded by two investigative propositions, including knowledge networks and innovative entrepreneurship. The selected case was an organic rice farming community from the Northeast region of Thailand. The research conduct was a qualitative grounded theory approach using focus group interview and documentary analysis for the research data collection. The study discovered that public supports engaged with the collaboration in the form of financial support scheme that shaped the delivery of the university outreach. The delivered university outreach then helped promote knowledge-based entrepreneurship development in the studied organic rice farming community enterprise. The university's essential contribution to the collaboration was required knowledge for innovation development for the business of the enterprise. The vital knowledge transferred was used to promote innovation in the enterprise, especially its production and marketing advancement. However, the study also found critical challenges requiring further development. These challenges were the lack of local farming technology creation, financial management, and skills improvement involving these challenging determinants.

Keywords: triple helix collaboration, regional economic development, innovative entrepreneurship, knowledge-based entrepreneurship, grounded theory

1. Introduction

Organic production has become in focus throughout Thailand, especially since the last decade. It has been promoted in various developed countries throughout the world for a longer time. Countries in the European Union, the UK and the USA have acknowledged the significance of organic products and services for social and economic matters. With its value-added products and services, organic agriculture has played a vital role in promoting the well-being of people and the economies of these countries. At present, the Thai government has enacted the national roadmap to organic agricultural development 2017 – 2021 as the second national roadmap to the development of organic production. This current roadmap sets the key vision to move Thailand to become the new regional leader in Southeast Asia for sustainable organic production, consumption, commerce and services with international standardization and certifications (Ministry of Commerce of Thailand, 2017). It aims to increase organic production to 181,818.18 acres by 2021, from 90,380.73 acres in 2015. It also sets a national goal to have more than 30,000 organic farmers, from 10,557 in 2015, in the country. The organic products are expected to obtain 40:60 of domestic: export markets. The roadmap also seeks to increase local organic production with endogenous knowledge throughout the country. The road expands its targeted farming contributors, not limited to only local farmers but also farming in the form of cooperatives, community enterprises, small and medium enterprises (SMEs) and registered businesses in various sizes. The current roadmap is developed with four primary strategies as follows:

- Promotion of research into organic production and the development of practical knowledge transfer systems.
- Development of organic agricultural products and services.
- Development of organic agricultural markets and the standardization of organic certification.
- Development of practical systems that promote national organic production.

Given the identified challenges faced by the current roadmap, this study will focus on the first primary strategy by delivering novel knowledge developed through empirical research into organic production and practical knowledge transfer systems. Thailand's current national development concept known as Thailand 4.0 aims at promoting economic development with value-added creativity and innovation. Organic agriculture is among the

ten primary economic sectors of the Thailand 4.0 policy. Given that innovation development requires necessary new knowledge, the local universities are expect4ed to play an essential role as the source of knowledge provider and the development of local business and organic farming industry. This study is a research into a knowledge exchange network model known as the triple helix model and its significance in promoting innovative entrepreneurship in organic rice production.

2. Research question

To succeed in the national goals identified above, local organic farmers across Thailand face a vital challenge for change and adding value to their production. They need to obtain and implement new knowledge to promote their creativity and innovation to become an innovative entrepreneur in the organic farming industry (Hérique and Faysse, 2020). By considering the importance of new knowledge required for innovative entrepreneurship development, this research will adopt elements of knowledge-based entrepreneurship. According to Hayter (2013), knowledge-based entrepreneurship is recognised as a vehicle for economic growth, focusing on knowledge network and their importance to entrepreneurial success.

The research question of the project underpinning this paper presentation was "to what extent the triple helix model of collaboration is practically implemented to promote innovation SMEs development in the Northeast region?" This proposed project will investigate the interplay between university-industry-government collaborating in university outreach projects resulting in knowledge exchange for innovative SMEs development.

3. Literature review

3.1 Thailand 4.0 and challenges to innovative SMEs development

Thailand is focusing on becoming a value-based and innovation-driven economy by moving from producing commodities to innovative products. The new concept of this national development model is known as the "Thailand 4.0" concept focusing on creativity and innovation, which have increased their importance in this recent concept underpinning the national economic development (Thailand Board of Investment, 2016). Given the Thailand 4.0 model, small firms such as SMEs are advised to be promoted into SME 4.0, which is the new entrepreneurial approach which new knowledge is now regarded as an essential element for Thai SMEs moving forward to creative and innovative development (The Office of SMEs Promotion-OSMEP, 2016).

However, to develop into innovative SMEs, firms must experience a challenge of new knowledge creation due to limited resources and capability to conduct research and development to foster their innovation (Wiklund and Shepherd, 2003). In addition to this challenge identified, Thai SMEs are also facing development constraints involving the lack of entrepreneurial capability (NakwaandZawdie,2016). To overcome this limitation, SMEs are advised to tap into the knowledge sources actively and entrepreneurial knowledge exchange networks to obtain new knowledge and entrepreneurial skill development required for their innovative development (Kanellos, 2011; Klomklieng et al., 2012). The triple helix model of collaboration is one of the models proposed and adopted widely for promoting knowledge exchange that engages partnerships among enterprises and their regional universities and government agencies (Mars and Rios-Aguilar, 2010). This research project will employ this model as the foundation for its investigation.

3.2 The triple helix model

The notion of a knowledge-based economy has brought universities into the central stage of gearing the knowledge system (Etzkowitz and Leydesdorff, 2000). There has also come the concept of the "triple helix" that captures the interplay of university, industry and government in the promotion of business innovation and provides a framework for the three entities to understand how to promote competitiveness and regional development (Farinha and Ferreira, 2013) , see also Figure 1 below.

The triple helix model has been adopted in promoting innovation development in countries driven by the notion of a knowledge-based economy across the world (Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2013). According to OECD (2013), the creation of innovative new firms and the development of SME innovation are strongly influenced by the extent to which localities offer environments that favour the transfer of knowledge to local business and provide the other resources required for innovative firm development. Essential elements of such development include skills, finance, advice, and supply chain partners (Chaochotechuang and Mariano,

2016; OECD 2013). Additionally, public policies at national and local levels have a crucial role to play in creating favourable local environments (Mars and Rios-Aguilar, 2010).

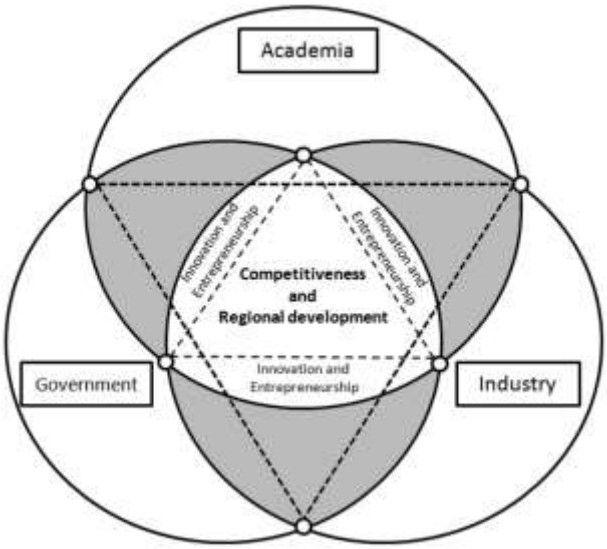

Figure 1: Triple Helix Triangulation (Farinha and Ferreira, 2013, p.18)

In Thailand, the triple helix is used to encourage applied research in local institutions and favour the creation of university-industry networks. As reported by Nakwa and Zawdie (2016), the collaboration has led to the supply of business development services, developing innovation infrastructures and supporting various business clusters. Multiple studies examining the employment of the triple helix model have been conducted in the Thailand context. They look into the hybrid organization of university-industry-government collaboration providing empirical evidence of triple helix adoption for innovative SMEs development in diverse industries, including poultry (Klomklieng et al., 2012), ceramic, textile and hard disk drive (HDD) (Nakwa and Zawdie, 2016), rubber (Puangpronpitag, 2015) and food and beverage industries (Chaochotechuang and Mariano, 2016). Despite the lack of triple-helix research in the agricultural sector, previous studies in other sectors have delivered examinations and discussions on investigative aspects, including (1) knowledge network development, (2) supporting factors and barriers of triple helix implementation, (3) collaborative activities, (4) systematic knowledge network development and (5) entrepreneurial ability of involved actors. These areas are therefore employed to guide the investigative conduct of this research project.

3.3 Knowledge-based entrepreneurship

The basis for a firm shaping its competitive strategy requires unique resources and capabilities (Kanellos, 2011). For innovative firm development, knowledge is asserted as the most important strategic resource generating superior business value. Innovative firms need to obtain sufficient knowledge leading them to gain further resources, such as financial supports and possessions of patents and intellectual property rights, and dynamic capabilities, including methods for building R&D, information technology, knowledge sharing, knowledge development and absorptive capacity (Kanellos, 2011). This strategy for firms seeking to foster their competitiveness and survival using this knowledge-driven approach is recognized as knowledge-based entrepreneurship (KBE).

At present, knowledge-based entrepreneurship has recently been recognized for its strength in practically fostering knowledge and skills relevant to developing new businesses, such as start-ups and innovative firms, and renewing existing businesses through entrepreneurship (Moutinho et al., 2016). This entrepreneurial development involves an ability to integrating knowledge about the interplay between services, design, and different types of expertise with processes of entrepreneurship, business development and commercialization.

The knowledge-based entrepreneurship model has widely adopted for innovative development. As firms gaining new knowledge and having access to external knowledge sources and networks, they also obtain an opportunity to develop a wider perspective of innovation (Kanellos, 2011; Qian, 2016). For this reason, the model is recommended for small-sized firms to overcome management constraints involving their traditional

characteristics, values and cultures (Wiklund and Shepherd, 2003). By considering its potential to help to foster innovative farming development, knowledge-based entrepreneurship has brought into the central focus of this research project.

3.4 Innovative entrepreneurship

Small and local enterprise development in Thailand is facing various facets of challenge specific to its context. Rujirawanich et al. (2011) identified cultural factors as the challenge. They find that Thai small-sized enterprise prefers to adopt incremental innovations rather than radical ones. They also discover that local productions are likely to experience difficulties with adopting completely novel innovations effectively.

Other studies suggest various difficulties that local enterprises in Thailand need to overcome. These identified difficulties include (1) low supportive resources, such as finance and relevant skills (Chaochotechuang and Mariano, 2016), (2) changing national culture impacts (Rujirawanich et al., 2011), (3) low supportive policy at local and national levels and (4) lack of trust among knowledge network participants and lack of academic entrepreneurship to help to commercialize the knowledge required for innovative firm development (Nakwa and Zawdie, 2016).

Findings on difficulties for innovative firm development reported from the Thailand context are consistent with research on knowledge-based entrepreneurship conducted by Moutinho et al. (2016) in Portugal analyzing components of knowledge-based entrepreneurship. Similar to Thailand, knowledge-based entrepreneurship in Portugal is still in its early stage; discussions of model implementation are mainly based on the literature, so they conduct exploratory research to provide a further empirical examination. Moutinho et al. (2016) find that all participating stakeholders identified by the model are lack desired entrepreneurial characteristics, knowledge commercialization capability and supportive systems to promote R&D and technology transfer. These stakeholders include universities and their staff, government agencies and their officials, firms and their managers. Similar to Portugal, studies in this area in Thailand is still limited and mainly base the implementation on the literature.

3.5 Knowledge networks

Knowledge networks are essential for economic development, especially at local and regional levels. It helps to tackle the limitation of resources for research and development required for the innovative production of small-sized firms. A previous study by Arbo and Benneworth (2007) confirmed this recommendation. Their study show interactions of regional businesses with non-regional actors for an exchange of resources (exports and regional investments), whereas universities exchange knowledge with non-regional actors (learning from non-regional academic communities and disseminating produced knowledge).

Despite limited previous studies in organic farming development in the Thailand context, a study conducted in Italy (Minarelli et al., 2015) has provided evidence on innovative food enterprise development using knowledge networks. The research has highlighted a relationship between types of collaboration and types of innovation; it discovers that "different types of collaboration and network types need to be tailored to the type of innovation sought" (Minarelli et al., 2015; p.42). This study has pointed out that knowledge-based entrepreneurship should be distinctive patterns depending on the empirical context of its employment.

According to the ligature reviewed above, knowledge networks are essential for knowledge-based firm development. Significant parties playing crucial roles in the development are interested firms seeking innovative development, regional knowledge institutions and local and national authorities for policy implementation.

3.6 Knowledge-based organic farming

Organic production has become in focus throughout Thailand, especially since the last decade. It has been promoted in various developed countries throughout the world for a longer time. Countries in the European Union, the UK and the USA have acknowledged the significance of organic products and services for social and economic matters. With its value-added products and services, organic agriculture has played a vital role in promoting the well-being of people and the economies of these countries. A previous study by Chouichom and Yamao (2010) investigates essential factors, including farmers' opinions regarding the business move towards the organic farming system. Essential factors making Thai rice farmers change to organic production include:

- 1. Higher educational level.
- 2. Existing connections with organic farming extension authorities.
- 3. Sufficient knowledge about organic farming systems.
- 4. Environmental benefits to the farm.
- 5. Positive individual perceptions of marketing and production advantages.

Another related literature is by Terziev (2006), who proposes agricultural knowledge and innovation system framework. The framework provides vital elements for the innovative entrepreneurship of innovative organic agricultural production. Given the framework, this research seeks to clarify three specific areas of entrepreneurial strategies, including (1) measurement of inputs in space and time, (2) market-focused technology development and (3) a self-teaching information system for farmers (Terziev, 2006).

By conducting a case study, it will consider the effects and influences of specific geographical, regional, organizational and individual characteristics of the selected case (Hammersley and Gomm, 2000). Terziev (2006) proposes that agricultural knowledge and innovation is necessary for innovative organic agricultural production. Sufficient knowledge and resources are required for the management of inputs, process and outputs. Also, knowledge sources such as higher education institutions are identified for playing a role in supporting science and technology knowledge. Management of marketing is also vital to lead the production towards an organic system. Connections will internal, and external partners such as processors and producers are also essential for organic promotion.

Following the review of related literature from Thailand and international contexts, it can be recognized that the development of entrepreneurship for knowledge-based organic farming is similar to the knowledge-based entrepreneurship development in other industries. It requires sufficient resources policy supports from responsive public authorities, knowledge support from higher education institutions, networks of knowledge transfer and effective business management through the inputs, process and outputs. Additionally, a specific factor raised in the study from Thailand context by Chouichom and Yamao (2010) is the positive attitude of the farmers towards the development required promoting connections and networks. Therefore, this research project put an investigative aspect on the individual perception in its central focus of the research inquiry into this study of knowledge-based entrepreneurship development in organic rice farming in Thailand.

4. Identifying the research gap

The reviewed academic literature and previous studies related to the research inquiry have recognized that knowledge-based entrepreneurship development in small firms requires knowledge and resource support from public authorities and knowledge provision institutions such as regional universities. They are advised to participate in knowledge networks to overcome their obstacle of limiting resources for creating new knowledge necessary for enhancing their innovation in production and management. For the organic agricultural industry in Thailand, however, previous studies in the field are relatively limited.

Nonetheless, related literature suggested essential factor of organic rice farming extension in Thailand as positive attitude and perceptions of farmers to move into organic farming systems. Other supporting factors are the higher level of knowledge for organic production and good connections with responsible organic promotion authorities. Following the review of literature, the study identified the gap missing from the knowledge in the field as empirical evidence of knowledge-based entrepreneurship development in organic rice farming at the local level, considered as the ground basis for the national economic growth given the recent national economic development concept known as Thailand 4.0. Concerning the focus on the tri-lateral network of collaboration engaged by the government, the university and business entities, individual experiences in the network will be scrutinized. The research method is provided in the next section.

5. Research method

5.1 A single-site case study

Given the research question, "to what extent the triple helix model of collaboration is practically implemented to promote innovation SMEs development in the Northeast region?" the researchers conducted a case study to examine the knowledge-based entrepreneurship development in a selected organic rice farming community

enterprise. This study applied the case study approach to defining the investigative boundary and associated research propositions. Given the case setting, the researchers identified the unit of analysis as the individual's experiences involving the enterprise's knowledge-based entrepreneurship development; the inquiry made into this empirical setting was not case-oriented, seeking to understand the organisational behaviour comprehensively. Instead, when selecting the research method, the researchers looked for a technique that would examine the determinants of knowledge-based entrepreneurship development in the chosen case. For this reason, the researchers chose the grounded theory approach considering the investigative focus of variable oriented, the no intervention of the researchers observing the research field.

5.2 Data collection

The researchers conducted a focus group using semi-structured open-ended questions to collect primary research data. The research fieldwork was carried out from January to February 2021. As pointed out by Patton (2002), semi-structured questioning allowed the researchers to predetermine the content but not the data collected. There were five participants sampled from the population of 47 members of the studied enterprise in the focus group. As presented in Table 1, the first participant was the founding member who was also recently responsible for leading and representing the enterprise. The second participant was another founding member recently responsible for the bookkeeping. The other two were ordinary members joining the enterprise for more than five years. The fifth participant had recently joined the enterprise for three years, after her family members. She was responsible for assisting the leader with general management duties.

Table 1: Focus group interview participants' profiles

Participant	Investigative Profile	Membership experience
1	The leader	7 Years
2	The bookkeeper	7 Years
3	Founding senior member	7 Years
4	Non-founding senior member	6 Years
5	Assistant to the leader	3Years

In addition to interviews, the researchers also collected secondary research data from descriptive documents with no or minimum conceptualizations, known as non-professional documents (Glaser, 2007). Sources of the papers included public reports, institutional journals, visual-audio documentary and official websites of national and local authorities. These documents allowed the research to gain local information about Thailand and the organic rice farming industry.

5.3 Coding and data analysis

Three crucial actions are coding throughout the analysis processes, comparing codes constantly with related literature and documents and revisiting the interview transcripts Charmaz, 2006). Four code types emerged throughout the operations, including initial codes, code categories, axial codes and theoretical codes. Initial codes were low-inference and did not yet provide a theoretical explanation (Glaser, 2007). Then, the emerged initial codes were classified (Corbin and Holt, 2007). After that, relationships across the categories were examined to identify axial codes (Corbin and Holt, 2007). Finally, axial codes were hypothesised of their relationships then tested their explanation of the case inquiry repeatedly across the data sources until the theory reaches its saturation, meaning that no further theoretical sampling for more data was required (Charmaz, 2006). Eventually, a theoretical code was developed to provide a theoretical explanation of the studied phenomenon (Glaser, 2007).

6. Research results

The grounded theory method allowed the researchers to simultaneously compared the emerging codes and categories with those identified in previous studies in the field, starting from the initial coding stage, throughout the data analysis processes. Reference and related literature to the concepts emerging at this stage are presented in Tables 2 and 3 below.

Then, providing the categories developed, relationships across categories are scrutinized while the researcherss revisited the related literature and interview transcripts of informants with diverse individual profiling. As a result, axial codes were developed, leading to the formation of theoretical code with its saturation. By based on these analysis procedures, the following sections explain the research results.

Table 2: Codes and categories for knowledge networks investigation

Initial codes	Categories	References/related literature
• Friends and relatives • Family members • Personal contacts • Personal references • Contacts with national politicians • Contacts with local politicians • Contacts with local academics • Local labours • Recurring customers	Informal contacts	Hamdani and Salah (2018) Hérique and Faysse (2020) Rice Department (2021)
• Public organic farming training programmes • Regional agricultural authorities' site visits • Organic certifying authorities' site visits • Regional university outreach and academic services • Complex governance of public supports	Formal knowledge supports	Crudu (2019) Hamdani and Salah (2018) Hayter (2013) Hérique and Faysse (2020) Kanellos (2013) Mortazavi and Bahrami (2012) Moutinho et al (2016) Rice Department (2021) Mensah et al (2018) Terziev (2016) Witt and Zellner (2007)
• Internal knowledge management (KM) • Public authorities' knowledge support • Regional knowledge spillover • Members' knowledge sharing • Local farming cluster • Knowledge exchange with business partners • Regional university outreach and academic services programs	Knowledge transfers	Crudu (2019) Hamdani and Salah (2018) Hayter (2013) Hérique and Faysse (2020) Kanellos (2013) Mortazavi and Bahrami (2012) Moutinho et al (2016) Rice Department (2021) Mensah et al (2018) Terziev (2016)
• Regional universities • Private R & D partners • Local business logistic services • Limited regional and local trade partners	External partners	Crudu (2019) Hamdani and Salah (2018) Hayter (2013) Kanellos (2011) Moutinho et al (2016) Mensah et al (2018) Terziev (2016)

6.1 Knowledge networks development

The first investigative proposition of this study is knowledge networks development. Focusing on how individuals tap into knowledge to gain access to the knowledge required, this proposition indicated the examination areas to include forms of participation, activities involved, roles of the participants and impacts of network participation on the enterprise's innovation development. In the initial analysis of the empirical data from the field, emerging initial codes, as presented in the coding tables above, led to the formation of four categories under this investigative proposition: informal contacts, formal knowledge supports, knowledge transfers, and extremal partners. Subsequently, the relationships across these categories were examined, leading to axial codes that explained the case under this proposition. Eventually, the study showed three critical outcomes:

- 1. Knowledge networks engaged by the university, industry and the government agencies were developed formally and informally.
- 2. Knowledge spill-overs existed through informal contacts and external partners.
- 3. There were knowledge institutions, national and regional authorities and private business partners involving in the knowledge transfer and networks.

Table 3: Codes and categories for innovative entrepreneurship investigation (continued)

Initial codes	Categories	References/related literature
• Lacking necessary farming machinery • Lacking research-based technological development • Lacking e-commerce development • Lacking modern distribution development • Lacking e-marketing • Lacking technical skilled labour • No use of accounting software	Technology	Crudu (2019) Kanellos (2011) Hamdani and Salah (2018) Hayter (2013) Hérique and Faysse (2020) Ministry of Commerce of Thailand (2017) Mortazavi and Bahrami (2012) Moutinho et al (2016) Rice Department (2021) Mensah et al (2018) Terziev (2016)
• Certified organic farming • Intensive quality control • Value added products • Creation of Marketable products • Local business collaboration • Cross-industry collaboration • Cross-regional collaboration	Production	Hayter (2013) Hérique and Faysse (2020) Kanellos (2013) Kanellos (2011) Ministry of Commerce of Thailand (2017) Mortazavi and Bahrami (2012) Moutinho et al (2016) Terziev (2016)
• S-T-P* for premium product • Main contracted buyer • National marketing partnership • Valued added products • Increasing brand awareness • Limited own distribution strategies • Limited own marketing strategies • Limited e-commerce • Limited regional marketing	Marketing	Hérique and Faysse (2020) Ministry of Commerce of Thailand (2017) Rice Department (2021) Terziev (2016)
• Main buyer's financial aid • Self-funding members • Local loan providers • Financial supports under the national organic farming policies • Limited use • of banking services • Limited accounting and auditing knowledge • No professional accounting advice	Financial management	Crudu (2019) Hérique and Faysse (2020) Kanellos (2011) Kanellos (2013) Mortazavi and Bahrami (2012) Moutinho et al (2016)
• Strict business ethics • Member's trustworthiness • Experienced leaders • Skilled labour force • Trained young family members • Brand loyalty • Land ownership • Endogenous farming knowledge • Limited marketing skills • Limited accounting and auditing skills • Limited information technology (IT) skills	Resources and skills	Hérique and Faysse (2020) Hayter (2013) Kanellos (2011) Mortazavi and Bahrami (2012) Rice Department (2021) Terziev (2016)

Note: * S-T-P = Segmentation-Targeting-Positioning

6.2 Innovative entrepreneurship determinants

Similar to the coding procedure for the first proposition explained previously, initial codes under this proposition were also presented in the above coding tables, Table 2 and Table 3. These codes led to classifying categories to include technology, production marketing, financial management and resources and skills. Relationships across these categories were examined, leading to the following axial codes. There were four discoveries delivered at this stage:

- 1. Innovation was adopted for production and business management.
- 2. Innovation enhanced entrepreneurial activities of production, marketing, resources and skills.
- 3. Determinants of innovative entrepreneurship existed in the production, marketing, resources and skills.
- 4. Key challenges that required further triangulating collaborations to promote the local community enterprise's knowledge-based entrepreneurship involved the lack of farming technology, inadequate financial management, and technical skills improvement.

6.3 Knowledge-based entrepreneurship development

The research question asked about how the triple helix model of collaboration is practically implemented to promote innovation SMEs development in the Northeast region. Given the question, the study looked to examine how knowledge-based entrepreneurship was developed in a local organic farming community enterprise. The eventual explanation of the case was provided as knowledge-based entrepreneurship development in organic rice farming community enterprise was developed using knowledge gained through formal and informal networks. The new knowledge acquired help promoting innovation in the enterprise' entrepreneurship for its production and marketing. However, elements of knowledge-based entrepreneurship development need to be enabled in other aspects of business management and production and marketing. These aspects included problem-based technology creation, professional financial management and accounting audit and skills improvement for these challenging managerial areas identified. Therefore, the limited development in these managerial features was recognised as challenging for Thai rice community enterprises to overcome to enhance their knowledge-based entrepreneurship.

7. Conclusion, limitations and recommendations for future research

This paper has presented an empirical case study research that utilised a grounded theory technique for the investigation. The paper has delivered the research conduct and its results. The empirical research setting was a selected organic rice community enterprise from the Northeast region of Thailand. The investigation focused on innovation development aiming at promoting the knowledge-based entrepreneurship of the studied enterprise. It laid an investigative foundation within the triple helix model of collaboration engaged by the local university and public authorities. By securitising the collaborative activities, the research results included various identified elements of the knowledge-based entrepreneurship development in the selected case and the recent challenges found, leaving the gap for improvement required. The study also discovered that knowledge-based entrepreneurship development in organic rice farming community enterprise was developed using knowledge gained through formal and informal networks. The new knowledge acquired was used to promote innovation in its entrepreneurship for its production and marketing. Recent challenges in the ongoing development were the lack of local farming technology creation, financial management, and skills improvement involving these challenging determinants.

Limitations of this research involve the investigative design of a single site case study and its qualitative approach. The outcomes, the discussions and the implications of the research results are bounded within the selected case's profiling of a regional organic rice community enterprise from the Northeast region of Thailand. Nonetheless, using the grounded theory method allowed the researcherss to discuss the results with related literature and previous studies theoretically; the approach significantly helped increase the accountability and implacability of the outcomes in other empirical contexts. Therefore, this paper recommends future research to investigate the triple helix collaboration in the organic farming industry, focusing on the key challenges this paper has identified, including the lack of local farming technology creation, financial management, and required entrepreneurial and production skills improvement.

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Pedagogical Techniques in Entrepreneurship Education Programmes in Nigerian Universities

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Abstract: In several countries, education policy makers are taking steps through curriculum designs to ensure that Entrepreneurship Education Programmes (EEP) contribute to the development of entrepreneurs, especially in nurturing entrepreneurial intentions (EI) in university graduates. In 2006, Nigeria introduced a compulsory EEP into the undergraduate curriculum as a compulsory module in all its universities, with the objective of fostering EI among its graduates. This paper explores the pedagogical techniques of the EEP to determine their conformity with best practices. It applied semi-structured interviews with six EEP lecturers from six federal universities in the North central geopolitical zone of Nigeria. The five dimensions of EEP model was applied to design the interview protocol for the study. Sample selection was through purposive sampling technique based on lecturers who have taught the entrepreneurship course being evaluated. The Thematic Network Analysis (TNA) step-by-step guide of Attride-Stirling (2001) was used to analyse the data. The TNA is considered a robust tool for the presentation and systematisation of qualitative analyses. It uses a procedure of a web-like network for organising and representing data and a pictorial representation of the network. Findings indicate that the EEP teaching techniques which the lecturers employ do not conform to best practices, which are capable of nurturing entrepreneurial mind-set. It is thus unlikely that the teaching will engender entrepreneurial mind-set in the programme participants and therefore doubtful that the EEP will attain its objectives. The lecture method is the most common type of technique that the lecturers employ. Innovative teaching techniques are rarely employed. Large class sizes relative to available facilities appear to pose constraints on the teaching methods that the lecturers can apply. In addition, the programme faces implementation challenges in instruction delivery related to inadequate infrastructure and lack of adequate training for the lecturers. The result has implications for policy reforms.

Keywords: entrepreneurship education, pedagogies, implementation strategies, thematic network analysis, University graduates, Nigeria

1. Background

The development of entrepreneurship education programmes (EEPs) as a course of study in universities has been growing rapidly (Katz, 2003; Kuratko, 2003). This is perhaps due to a rise in the recognition of entrepreneurship as a source of economic development and growth, or the desire to increase potential entrepreneurs through the teaching of entrepreneurship in schools (Kuratko 2005; Chiu, 2012). Educational interventions with EEPs aimed at addressing poverty reduction, innovation, and unemployment have become commonplace.

In a bid to find solution to the endemic graduate unemployment, the policy to include entrepreneurship education in the curriculum of Nigeria's undergraduate education was formulated in 2002. Subsequently, by a Federal Government's mandate, entrepreneurship education was in 2006 inserted into the Nigerian universities' undergraduate curriculum as a compulsory programme for all students irrespective of their programme of study. The aim of the programme is to develop entrepreneurial intention (EI) in the graduates and consequently produce entrepreneurial individuals who will create new ventures instead of seeking employment (National Universities Commission, NUC, 2011). The programme was therefore an attempt by the federal government to provide knowledge and skills for entrepreneurship to reduce the malaise of graduate unemployment through developing self-employed graduates which will result in job creation (Eze and Nwali, 2012; Ekoja and Odu, 2016; Agwu, 2019). However, there have been doubts as to whether the programme is achieving its objectives given that there was inadequate preparation with regards to appropriate teaching techniques (Ifedili and Ofoegbu, 2011).

To ensure that the programme provides the anticipated benefits, its evaluation is essential. Given the place of pedagogies in achieving educational objectives, this paper evaluates the pedagogical techniques of the EEP to ascertain their conformity or otherwise to best practices. The paper is part of a larger study which evaluated the implementation strategies of the EEP. Existing literature has not addressed this subject in the Nigerian context. The few available studies evaluated entrepreneurship education (EE) for sustainable development (Arogundade, 2011; Nwambam et al., 2018), and EE and career intentions (Ekpo, 2011).

The rate of graduate unemployment in Nigeria has been worrisome (Ayoade, et al., 2020). The National Bureau of Statistics (2016) reports that fresh graduates constitute the majority of the 52 million economically active but jobless Nigerians. Indeed, the unemployment situation is thought to be a major contributor to social crises and terrorist activities in the country (Ajufo, 2013; Asaju, 2014; Eme, 2014). Given that teaching method can affect the development of EI and studies examining this in the context of this research are few, creates knowledge gap in the EE literature that this study aims to fill.

2. Literature review

Despite the increasing demand for EEP in educational institutions, how to teach it still lacks attention (Jones and Matlay, 2011; Sirelkhatim and Gangi, 2015). Considering that the way EEP is taught contributes to its outcome, examining the pedagogies employed becomes imperative. The study of the effect of EEP cannot be completely detached from the pedagogical engineering of the subject (Bechard and Gregoire, 2005). Instructional techniques are expected to focus on promoting an entrepreneurial mind-set among participants (Yamakawa et al., 2016; Wardana, et al., 2020). As the traditional teaching is thought to impede the development of entrepreneurial attitudes among learners rather than impacting hem positively, the innovative pedagogies that promote attitudinal changes towards entrepreneurship appears essential for learners to gain experience-based knowledge, which can influence entrepreneurial action (Gibb, 2002; Krueger, 2007; European Commission, 2011: Fayolle and Toutain, 2013). Nevertheless, the utilisation of innovative methods is perceived not feasible by some educators due to inadequate preparation (Ofemile and Chukwuma-Nwuba, 2018). It is essential, therefore, to understand the methods adopted for teaching EEP in Nigerian universities, so as to ascertain whether the methods are capable of providing the participants with the experiential learning that can nurture the development of EI.

Another subject for consideration with regards to pedagogies lies in determining which methods are innovative and those that are traditional. It is generally accepted that the traditional methods are theoretical, teacher centred and more suitable for increasing learners' awareness about entrepreneurship, and deemed less appropriate when educating for entrepreneurship (Piperopoulos and Dimov, 2015; Sirelkhatim and Gangi, 2015). Nevertheless, there is no clear-cut demarcation between traditional and innovative methods because while some methods are traditional in some contexts, the same are innovative in others due to differences in technology, exposure, and advancement. For example, whereas Bennett (2006) regards lectures, case studies and group discussions as traditional, Arasti et al., (2011) found that case study is one of the most important methods for teaching entrepreneurship in Iran. Some methods are apparently generally accepted as traditional and some as innovative.

Pedagogies vary extensively in the teaching of entrepreneurship programmes, and the best methods are contentious (Porter, 1994; Mwasalwiba, 2010). This heterogeneity demands the application of best-practice concepts to ensure an effective and impactful entrepreneurship education (Haase and Lautenschläger, 2011; Cunningham and Lischeron, 1991). Further, it is crucial to have coherence between the entrepreneurship programme and the pedagogies applied (Fayolle, 2013; Wardana, et al., 2020). EE should, therefore, provide learners with the knowledge to pursue opportunities without regard to the resources they currently control. The engagement of students in entrepreneurship classes seems to be the most crucial factor for attracting students and for achieving learning objectives (Coates, 2009) and not necessarily, having a universal teaching method.

Despite the observation of researchers that the innovative methods are better for motivating entrepreneurial intentions, findings suggest that the traditional methods are mostly applied in delivering entrepreneurship modules (Bennett 2006; Mwasalwiba, 2010; Arasti et al., 2011). Perhaps the continuous implementation of the traditional methods is due to its ease of application without consideration of its relative ineffectiveness (European Commission, 2008). Nevertheless, some scholars including Kent, (1990), Gartner and Vesper (1994), Solomon (2008) and Mousa (2014) observe that the adoption of innovative methods like guest speakers is becoming widespread. Yet, the lecture method appears to have continued to dominate the scene. NIRAS consultants (2008) surveyed entrepreneurship in Higher Education (HE) in 31 countries of Europe, including 27 European Union member states and found that entrepreneurship modules were taught mostly by lecture method. In these circumstances, the possibility of EE focusing and achieving success in new venture creation appears bleak.

Generally, many EE researchers recommend the incorporation of more action-oriented approaches and reflective practice to stimulate entrepreneurial thinking (Saravasthy, 2008; Neck and Greene, 2011; Esmi et al., 2015). For example, the invitation of guest lecturers to share their experiences and interact with the learners might influence learners' attitudes and motivation towards entrepreneurship (Diegoli et al., 2018). Other methods commonly found are project-based learning like interviews with entrepreneurs, environmental scans, student entrepreneurship clubs, student business start-ups, feasibility studies, placement with small firms and business games (Gartner and Vesper, 1994; Solomon et al., 1994; Truell et al., 1998; Solomon, 2008). Perhaps the variety of methods provides the opportunity to choose and combine those that are appropriate to specific learners' interests, the local environment, and the objective of the programme. Hence, it is vital that the methods used for each EE variant are examined to determine their veracity in the fulfilment of objectives. This study addresses this theme. It aims to establish the conformity or otherwise of the pedagogies to best practices.

2.1 Theoretical framework

The study applied the five dimensions of EEP model (National Agency for Enterprise and Construction, 2004) to design the interview protocol. The model (Figure 1) is suitable because it views EE as a discipline that is beyond basic educational programmes (Hoffmann, et al., 2008) and it has been tested across 27 universities in USA, Canada, and Denmark. The educational set-up covers all academic activities, like entrepreneurship courses offered at various levels in HEIs, and entrepreneurship research. Educational scope is the motivation of creativity and allowing students to experience real-life entrepreneurial practice, while the outreach dimension refers to the connection between the HEIs and all the relevant resources outside the university walls. It further means the provision of guidance that help students to identify business opportunities. Institutional characteristics involve providing financial aid to support EE from all the stakeholders. Finally, evaluation encompasses the evaluation of the programme which is what this research is doing. The evaluation of EEPs provides the occasion for modifying the programme to suit the needs of current students and other stakeholders.

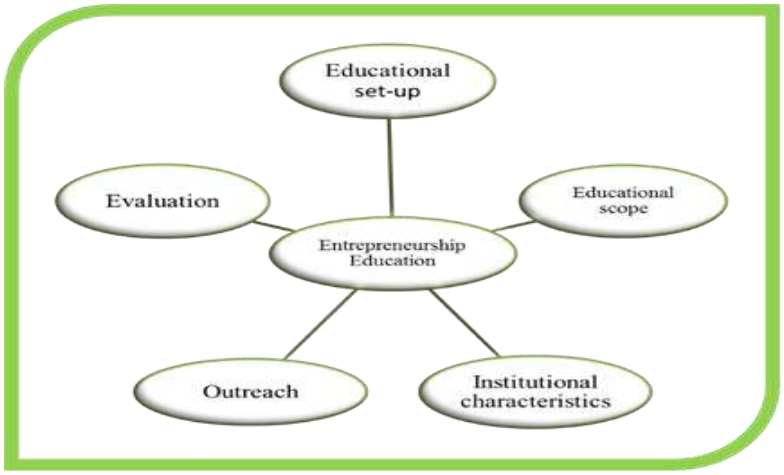

Figure 1: The five dimensions of EE (reproduced from NAEC (2004).

3. Research methods

Semi-structured interviews were used to elicit responses from a sample of six entrepreneurship lecturers, one from each of the six federal universities in the study area. The interview was grounded in literature and phrased in a way that the interviewees would easily understand (Hazenberg, 2012). It was written in English, the official language of instruction in Nigeria's educational institutions. All the interviewees were academics. The interviews were recorded. The selection of sample considered lecturers who have taught the entrepreneurship course being evaluated. Purposive sampling was used to select the lecturers who met this criterion from the teaching timetables. Subsequently, the lecturers were contacted and those who consented were interviewed. Saturation was achieved after three lecturers were interviewed as the data collection no longer produced additional information or knowledge (Cresswell, 2014). Nevertheless, six lecturers participated, because having representatives from all the Federal universities in the zone was essential.

The data analysis followed the thematic network analysis (TNA) step-by-step guide of Attride-Stirling (2001). The TNA is considered a robust tool for the presentation and systematisation of qualitative analyses and seeks out the relevant themes in texts at different levels (Attride-Stirling, 2001). It also uses a procedure of a web-like

network for organising and representing data and a pictorial representation of the network. Using TNA, the themes emanating from the interview transcripts were determined and organised into graphical illustration, termed "thematic network".

4. Findings and discussions

Codes were used to identify the respondents in order to maintain anonymity. Four of the lecturers were male and two were female. Table 1 presents their demographic characteristics.

Table 1: Demographic characteristics of EEP lecturers

Respondents' University	Gender	Resp. ID	Highest Educational Qualification	Educational Background	No. of Years of Teaching EE	Have Entrepreneurial Experience
001	M	M001	PhD	Agric Economics	9	No
002	F	F002	MSc.	Agric Economics	12	Yes
003	M	M003	PhD	Management	11	Yes
004	F	F004	MSc	Agric Engineering	5	No
005	M	M005	MSc.	Agric Economics	3	No
006	M	M006	MSc.	Accounting	3	No

Source: Author's Field Interview

4.1 Thematic network analysis

The themes were summarised and presented in Table 2 and the thematic network was constructed. The results were interpreted and discussed at the basic themes level since they derive directly from the interview transcripts. As indicated in Table 2, four themes were abstracted at the lowest level, with two organising themes, EE Pedagogies and implementation challenges related to instruction delivery. The global theme is EE implementation strategies.

Table 2 indicates the three levels of the themes in the data analysis. To construct the thematic network, the themes were organised at three levels. Substantial statements were selected from the interview transcripts and the similar themes emerging were grouped together to form the basic themes which is the lowest-order premise. With the formation of the basic themes, the interview transcripts were reduced to a manageable cluster of significant themes. To generate the Organising themes, the basic themes are grouped into identical subjects and summarised into appropriate categories. At the top level of the network is the Global theme referred to as the super-ordinate theme. The Global theme was used to group the organising themes into a set of a common position vis-à-vis the phenomenon being investigated. It encapsulates a cluster of the lower-order themes that were extracted from the interview data.

Table 2: The themes

S/N	Basic Themes	Organising Themes	Global Theme
1	Traditional Methods	EEP Pedagogies	EEP Implementation Strategies
2	Innovative Methods		
3	Training	Implementation Challenges	
4	Infrastructure		

Source: Author's Interview Scripts

Figure 2 shows the relationships between the themes at the various levels. It is the web-like representation of the summary of the themes that were extracted from the participants' responses to the interview questions. The thematic network links each basic theme to its organising theme and each organising theme is subsequently linked to the global theme. The figure provides a whole picture of the relationships of the theme hence it gives clearer representation of the outcome of the data analysis.

Table 3 indicates that the lecture method is the most common teaching technique that the lecturers employ. This finding is consistent with Bennet (2006) and Mwasalwiba, (2010) but disagrees with Mousa (2014) who noted that HEIs are now adopting the innovative methods. The other methods employed are case studies and business planning, used by only two of the respondents. Only one respondent uses class participation. All these are traditional teaching methods. The only innovative teaching method the respondents employ is case studies.

Overall, out of 12 teaching methods indicated in the interview protocol, the respondents use only four, comprising three traditional approach and one innovative method. The cross-tabulation demonstrates that three lecturers apply only three of the 12 methods while the remaining three use just one method (the lecture method). This means that the lecturers do not use most of the methods which are incidentally the innovative methods. This finding suggests that the learners will rarely gain the benefits which the innovative teaching methods provide.

Figure 2: Thematic network of EEP implementation strategies

Table 3: Teaching methods used by EEP lecturers

Teaching Methods	M001	F002	M003	F004	M005	M006	Total Per Method
Lecturing (TTM)	X	X	X	X	X	X	6/6
Class participation (TTM)			X				1/6
Case studies (IT)		X	X				2/6
Individual assignments and projects (TTM)							0/6
Group projects and assignments (TTM)	X						1/6
Oral presentations (TTM)							0/6
Role Play (IT)							0/6
Business plans (TTM)	X	X					2/6
Entrepreneurial projects (TTM)							0/6
Guest entrepreneurs (IT)							0/6
Excursions - field Trips (IT)							0/6
Internships (IT)							0/6
Total by Lecturers	3/12	3/12	3/12	1/12	1/12	1/12	

The reasons the respondents advanced for commonly using lecture method as Table 4 shows, is that the classes are too large for the classroom spaces available. Respondent F004 stated that 'some students even receive lectures through the windows', indicating that the classroom spaces were too small for the number of students.

The insights exhibited by the lecturers during the interview as accentuated in Ofemile and Chukwuma-Nwuba (2018) disclosed that the lecturers do not assess the application of innovative methods feasible. Receiving lectures through the windows cannot be comfortable for students and this can lead to loss of interest which can impact on attitude towards the subject. Teaching is also unlikely to be effective enough to motivate entrepreneurial attitudes and intentions in such conditions. This condition in addition to the rare use of innovative methods, can hinder the interest of the learners and adversely affect intentions towards entrepreneurship. The finding that innovative methods are rarely applied is not in line with researchers' recommendations that more action-oriented techniques that allow students to take ownership of their learning should be applied to stimulate entrepreneurial thinking (Saravasthy, 2008; Neck and Greene, 2011; Esmi, et al., 2015). The finding does not also take cognizance of the heterogeneity in EE pedagogies that demands the

adoption of best-practice concepts to develop an effective EEP, as Cunningham and Lischeron (1991) and Haase and Lautenschläger (2011) have suggested.

Table 4: Text evidences of the methods used by the respondents

Respondent	Text Evidences from Interviews
	What methods do you use in the teaching of GST Entrepreneurship?
M003	Mostly lecture methods with a mixture of case studies.
M001	I use lecture methods, but I also teach them how to write business plans. ***Follow-up Question: Do they write plans on businesses of their choice?*** No, I give them the business type and they work in groups.
M005	Lecture method. But we have a farm. University farm. So, we do some practice there. You know our school is in a village with plenty land ***Follow-up Q: Are the students interested in becoming farmers?*** We only use it as our practical session. [pauses] … At least they will gain something. Obviously not all of them will be interested in becoming farmers.
M006	[Sighs] Just lecture methods. We don't have facilities being one of the youngest federal universities in the country… You know we are still at our temporary site…
F002	We use lecture method mainly, and occasionally we use business plans, and case studies. Because it's only a semester programme, it's hard to achieve much really, not to talk of the content that is [hesitates] 'dry' ***Follow-up Q: Can you explain what you mean by dry?*** It's theoretical and more or less conceptual. There is not much in terms of practice that can be achieved. I lecture and explain or discuss the various concepts ...
F004	Lecture, madam. Are you expecting any other method? The class is like … market. Some students receive lectures through the window. [Looks down] Wow! Never really thought of it this deeply.

Source: Interview Transcripts

4.2 Implementation challenges

The programme faces challenges related to instruction delivery. These were grouped into two basic themes, namely, training and infrastructure.

Inadequate facilities appear to be a challenge. For example, the classroom environment looks to be one of the lecturers' main frustrations. Given that the module is compulsory for every undergraduate, the classrooms tend to be inadequate for the class sizes. As the extracts show, in some cases students receive lectures through the windows. Most of the lecturers interviewed mentioned that the large classes make it impracticable for some relevant practices such as the application of some teaching methods. The respondents were asked:

Are guest lecturers/practitioners with practical experience used in entrepreneurship classes? Give reasons for your answers.

> *M003 responded:*
>
> *[Laughs] Madam, you are talking as if you are not a Nigerian. We do not have provision for such. Besides, the lecture rooms/environment are not conducive. Our classes are like marketplaces. I think you are thinking that we are in England. [laughs] [pauses]. I wish that is practicable. So, I do not involve practitioners in teaching. Even the sizes of the classes will not permit it … I wish you have time to attend one of our sessions but unfortunately, we are currently in exam period [laughs]; you will be sorry for us.*
>
> *F002 responded likewise saying,*
>
> *[Hmmm…] There are so many methods that can be applied but we limited the methods to the three I mentioned earlier because of the number of students and the time allotted that is rather short for the programme considering that there are too many topics to cover – to adopt many styles will reduce the time to cover the syllabus.*

Infrastructural inadequacy is thought to undermine the success of the programme. The findings therefore underscore the need for the provision of more facilities for the implementation of the programme.

Furthermore, The EEP lecturers do not seem to have the relevant training that would have equipped them with the knowledge of the experiential pedagogies. In response to a question on training he had received since he started teaching the module, M001 responded, [Laughs] 'Personally, I have not received any training…'. Likewise, M005 laughed and said, '… I have not received any training'. Furthermore, respondent M006 stated, 'Training? [Pauses] Are you asking about training specific to me as a lecturer of entrepreneurship? None'.

Three of the six interviewees have not had any form of training since they started on the programme. Moreover, the training that the remaining three have attended seems inadequate to equip them for effective instruction delivery. As respondent F004 stated,

> *We attended a training … in Lagos. … but it was certainly not what I expected. They focussed primarily on what I already know from the books. Nothing new really. … I was looking forward to them teaching us how to get students interested in becoming entrepreneurs; how to arouse their interest. But it was more like giving us definitions … It was a one-week workshop, but I stopped after the second day.*
>
> *Furthermore, M002 stated:*
>
> *… We had a one-week workshop in Lagos and I still do not know the relevance of the training to what we teach… it had nothing in it that is related to the course outline of the programme.*

This finding is significant considering the role of training in the implementation of educational intervention programmes. It suggests that the universities did not adequately consider the relevant training required for the success of the programme. Had they thought it through, perhaps relevant and adequate training would have been given to the lecturers. The implication points to reforms in the programme implementation strategies. The universities need to develop and implement training programmes for the EE lecturers. For the expected learning outcomes to occur, lecturers' training should be given adequate attention. With the void created in training and development, there is no guarantee that the lecturers will be able to deliver teachings that can impact on the attitude of the participants towards entrepreneurship and their EI.

5. Conclusion

Overall, the findings demonstrate that the best practices which are capable of nurturing entrepreneurial mind-set are not adopted in the EEP instruction delivery. It is therefore unlikely that the teaching will engender entrepreneurial mind-set in the programme participants. Consequently, it is doubtful that the EEP will attain its objectives as Ifedili and Ofoegbu (2011) expressed. The implementation strategies thus appear to be limiting the capacity of the programme to produce the desired outcome.

The inference from the results is that learners' potential for entrepreneurial insights and attributes are not being maximised. The findings have implications for policy reforms in the EEP implementation strategy with respect to pedagogies. Such reforms should include relevant training for the lecturers and the provision of infrastructure necessary for the application of experiential methods. The implication for practice is the need for the EE teachers to work out ways to be more innovative in their teaching which will move them towards best practices rather than being seemingly complacent with the situation on ground. The research contributes to the EEP literature and makes an original contribution to knowledge by providing an emerging economy perspective based in the Nigerian context. Further, the study expanded the theory of planned behaviour and thus contributes to the entrepreneurial intentions debate, and more significantly in a context where EE and EI research is low. This has implications for policy and practice. It is expected that it will lead to the further exploration in EE and be helpful to the government in its bid to reduce graduate joblessness through educational interventions. Additionally, the finding that innovative pedagogies are seldom used has implication for practice. Reforms of the implementation strategies particularly in relation to pedagogies is advocated. Similarly, the exploration of the implementation of EEP contributes to the practice of teaching entrepreneurship programmes.

The limitation of the research is that it evaluated EEP implementation pedagogies at a point in time. Further research should use longitudinal study to allow data collection at various times. Despite this limitation, the study has generated findings that have significance for policy and practice.

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Comparative Cases From Portuguese Social Innovation Public Policy

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Abstract: Innovation generally involves poorly structured problems, which do not have an obvious solution within the knowledge available. The solution is usually evolutionary, resulting from several attempts and refinements. Social innovation aims to address social problems and needs, which happen regardless of economic odds. This innovation can be an answer to a social need by embedded solutions and by different stakeholders' mobilization to sustain effective social change. It also can be about the best resource use or cost reduction, mainly the social ones. Portugal has developed a pioneer public policy to encourage entrepreneurship, social innovation and boost the social investment market. The Portugal Social Innovation Programme (PIS), links investors and social entrepreneurial initiatives (SEI) and offers support to structure SEI in a sustainable way by providing resources and network. Insofar SEIs accomplish the contracted results, PIS rewards their private investors. Thence public and private capital share risks, and the public capital is driven to the most effective initiatives. PIS enables the experimentation needed for innovation building and increases the chance of public services improvement, contributing to enhance the welfare-state. In this sense, this research goal is to describe three revealing cases of SEIs supported by PIS, highlighting innovation features and contextualizing theory. The data was collected by 3 semi-structured in-depth interviews which responses could be found in a database with 120 cases built by an online survey. The thematic content analysis was conducted applying codes from theory and PIS's investment criteria. Then cases were compared to understand the outcomes of investment criteria and to examine theoretical features. The study discusses PIS investment criteria and presents SEIs types endorsed by it. Thus, it helps disclosure and stakeholders' expectations management. It also enables understanding the relationship between innovation, business model sustainability, and social value creation in the Portuguese context. The SEIs analyzed endorses PIS's innovative potential in building networks and foster the entrepreneurial ecosystem. This study also poses a new way to identify and compare different kinds of social values paving the way for a less subjective and tricky assessment routine.

Keywords: social innovation, public policy, social investment, social entrepreneurial initiatives, social entrepreneurship, social value assessment

1. Introduction

Social entrepreneurship aims to understand business models (Seelos & Mair, 2005) that seek to efficiently supply basic human needs, which conventional structures fail to satisfy because of its institutional voids (Stephan, Uhlaner & Stride, 2015). These business models have evolved from two concomitant strands (Defourny & Nyssens, 2010): the traditionally not-for-profit models' adaptation by the extensive adoption of managerial practices (Dees, 1998; Ramos & Martín, 2001) and new business models motivated by opportunities exploration in solving social problems (Yunus, 2010; Seelos & Mair, 2005). There are many ways to do business with social purpose, but not all of them emphasize social goal (Barki, Rodrigues & Comini 2020). Properly identifying and comparing SEI is still a challenge (Rawhouser, Cummings & Newbert, 2019; Bosma *et al*, 2016), even with most of the research concentrated at the organizational level (Erpf & Tekula, 2019). Hence, constraining the development of adequate support structures (European Commission, 2016; Myrah & Odinsky-Zec, 2013).

To help overcome this issue, examples of Portuguese social innovation are introduced to contextualize theory (Eisenhardt, 1989; Ghauri, 2004) and offer benchmarking. It starts from the acknowledgment of what does motivate social investment (Ciccarino & Rodrigues, 2019; Ciccarino *et al*, 2019) to enable a better fit between investor's goals and SEI proposal. These SEIs are embedded in a context that provides the opportunity to study social investment selection and public policy support, paving the way for multidisciplinary research still little explored (Ciccarino & Borges, 2020).

The paper is developed as follows: First, the theoretical foundation shows the main concepts used to describe SEIs. It also provides a context for a better understanding of their selection. Then the methodology used is explained, and the cases are introduced and analysed comparatively. Finally, conclusions are displayed.

2. Theoretical foundations

2.1 Social entrepreneurship and its investment need

Social entrepreneurship is a response to the increasing complexity of social issues (Rawhouser, Cummings & Newbert, 2019; Hadad & Găucă, 2014) as the increasing demand for collective interest services (European Commission, 2016), and the pressure for social costs reduction (Cabral *et al*, 2019; Hoogendoorn, 2016). SEI are unlike the social movements, that are marked by spontaneity and relative informality (Barki, Rodrigues & Comini, 2020). They must constitute economically viable and financially independent business models, with a stable operation to guarantees their activities autonomy and their social value continuity (Barki, Rodrigues & Comini, 2020; European Commission, 2016). Some advantages related to the sources of funds are advantages of social goals, such as tax benefits, donations, and discounts obtained by empathy. The voluntary labour is also part of this exclusivity (Lumpkin *et al*, 2013; Dess, 1998), but prevent important competence building and harm productivity (Bacq & Eddleston, 2018; European Commission, 2016). Furthermore, SEI has more difficulty mobilizing resources directly from the market than conventional initiatives, mainly due to the constraints in redistributing dividends (Símon-Moya & Revuelto-Taboada, 2012; Yunus,2010). Most SEIs face difficulties in accessing finance (Dwivedi & Weerawardena, 2018; G8, 2014), growing organically (Hitt *et al*, 2011), or becoming dependent on sponsorship (Leviner, Crutchfield & Wells, 2006; G8, 2014). Funding allows SEI to focus on achieving social goals (Cannatelli, 2017) explore opportunities, and reach an appropriate scale (Baumol & Strom, 2007).

Anyway, to achieve success, a SEI must offer the most efficient and effective option among all alternatives (Lopes *et al*, 2017; Khan, 2016). Only that way SEI can access traditional sources of social support like donations and grants (Lumpkin *et al*, 2013; Dess, 1998), benefit from partnerships with companies that wish to explore new market niches (Seelos & Mair, 2005), or attract social investment (G8, 2014; Yunus, 2010). Social entrepreneurship has its own value creation process (Seelos and Mair, 2005; Hlady-Rispal & Servantie, 2018) where the social cause favours sharing and collaboration. There are fewer barriers against imitation, and it is much easier to replicate ideas (Cannatelli, 2017). Therefore, adaptions from commercial techniques fail to report the extent of SEIs' results and are limited as management guidance (Rawhouser, Cummings & Newbert, 2019; European Commission, 2016) or investment decision criteria (Ciccarino *et al*, 2019).

The difficulty of creating a systematic social value assessment can impair the synergy between the various stakeholders, and, consequently, the efficiency of the operation (Barki, Rodrigues & Comini 2020; Lumpkin *et al*, 2013) and even the SEI survival (Hlady-Rispal & Servantie, 2018), as the collaborative aspect of network relationships often compensates for resource limitations (Bacq & Eddleston, 2018; Hadad & Găucă, 2014). It is important to foster a better fit between investors' goals and SEI proposals (Ciccarino & Rodrigues, 2019; Ciccarino *et al*, 2019).

2.2 Portugal social innovation public policy

In 2014, the Portuguese government allocated 150 million euros from community funds to develop a pioneering public policy intended to promote social innovation and boost the social investment market (MIES, 2015). Portugal Social Innovation (PIS) allows the experience of new ideas to deal with social problems, through the identification and financing of SEI (Ciccarino *et al*, 2019). Portugal is the third country in terms of social economy representation in Europe, behind only Finland and Switzerland. The Social Economy is present across all economic activities and in all regions, also creating a significant number of jobs. In addition to investing in a stable and important economic segment, PIS seeks to meet a pent-up investment demand of around 750 million euros (MIES, 2015).

PIS encourages private capital to invest in SEIs by sharing the risk. PIS provides the resources for structuring the SEI and for the invested private capital reward when the SEI achieves the contracted results. This dynamic directs more public resources to the most effective solutions while offering a support structure to enable experimentation. It is a more complex program than the traditional social bonds (Harvie & Ogman, 2019), with the potential to be more effective. PIS enables the experimentation needed for innovation building and increases the chance of public services improvement (Ciccarino & Borges, 2020). Expanding the synergy between government, social investors, and entrepreneurs, contributes to the social cost reduction and to increase the offer of collective-interest services (Cabral *et al*, 2019). And the demand for these services has grown in Europe

in recent years (European Commission, 2016) while there has been a reduction in public social investments (Hoogendoorn, 2016; Souza, 2006).

While most of the SEIs belong to small and mature organizations, PIS also funds new ones, overcoming installed capacity-based choices due to business maturation, network, and reputation. (Bernardino & Santos, 2017). Because a SEI can be a business model, project, or organization (European Commission, 2016; Ciccarino *et al*, 2019) PIS also promotes the bees in the trees process. This means that individuals with good ideas (i.e. bees) can seek out larger organizations to develop them (i.e. trees) creating a relationship of mutual benefits in analogy with pollination. It builds innovation at the ecosystem level (Moulaert *et al*, 2017) and increases entrepreneurial rates (i.e. GEM and GEDI indexes) (Bosma *et al*, 2016).

2.3 PIS social investment criteria

There are sporadic contests for each type of support, in other words funding is not continuous. The SEI's selection for investment is based on comparison with other contenders (Almeida & Santos, 2017). There is no prior guidance on the type of social goal nor on the type of social change that is encouraged such as in global investors like Ashoka and Yunus Social Business (Ciccarino & Rodrigues, 2019). It puts the program in line with the concept of social management (Ciccarino & Borges, 2020). Social management replaces the traditional public policy order, changing from State-Society to Society-State formulation. Therefore, replaces the narrative that considers the person and his family as a target or a passive beneficiary of social policies with a narrative that puts them as the protagonist. The solution is built with their participation (Tenorio, 2012). The social entrepreneur is the spokesperson that deeply understands the issue and the community, then poses a solution to leverage impact (Leviner, Crutchfield & Wells, 2006).

The main investment criterion is innovation, which must be the most efficient and effective among all contenders. It must represent something unprecedented or something that does not exist in the target territory, including all businesses that can substitute the value proposition. Then they are required to defend a concise definition for the social problem and the target audience, with expected impacts, results already obtained or supported by reliable information, well-established and realistic indicators (Ciccarino *et al*, 2019). Partnerships with universities are encouraged to validate indicators, endorsing the triple helix innovation effect (Etzkowitz & Leydesdorff, 2000).

SEIs also must be able to prove its ability to achieve the goals, and, if not their business model sustainability, at least the plan to achieve it. There is an awareness that not all solutions are capable of being financially sustainable from the start and that some may not achieve this condition through the market, needing to build partnerships that guarantee their social value continuity. Afterward, the criteria of gravity of the problem and the solution's scope are weighed in a comparative way. The program favours solutions that deal with more serious problems or that have greater coverage to ensure the best investment use. This guarantee is often backed by a private partner who shares the investment risk with PIS (Ciccarino *et al*, 2019). In sum, the main criteria are social value creation and innovation (Almeida & Santos, 2017), which theoretical bases are discussed in subsequent sessions.

2.4 Social value evaluation

The social value creation is related to the SEIs' mission (Ormiston & Seymour, 2011) and their strategy and decision-making process (Hlady-Rispal & Servantie, 2018). The social entrepreneurship literature lacks consensus on criteria and general definitions about it (Rawhouser, Cummings & Newbert, 2019) that turns difficult to establish outcome measures (Clark & Brennan, 2012; Lumpkin *et al*, 2013).

The social result evaluation is influenced by points of view (Myrah & Odinsky-Zec, 2013). Clark and Brennan (2012) warn that "(...) *a social entrepreneur can be very effective in delivering results, but the beneficiaries do not perceive the benefit*" (p.29). In addition, social problems and their causes are poorly known (Rawhouser, Cummings & Newbert, 2019; Hadad & Găucă, 2014). In general, an ideal result is a parameter to short and long-term goals (Rawhouser, Cummings & Newbert, 2019). The social effects to deal with different social needs cannot be directly compared (Ormiston & Seymour, 2011). The social value is what an SEI produces and delivers (Hadad & Găucă, 2014; Clark & Brennan, 2012) and can be evaluated from an objective and subjective perspective (Rawhouser, Cummings & Newbert, 2019; Ciccarino, Rodrigues & da Silva, 2021).

The objective social value is depicted by the traditional quantification (Leviner Crutchfield & Wells, 2006; Ciccarino & Rodrigues, 2019). The paid jobs created are fundamental to assess the SEI's size and sustainability potential (Bosma *et al*, 2016; Ramos & Martín, 2001; Dees, 1998). Bacq and Eddleston (2018) found a positive correlation between the number of full-time employees and the scale of impact on society. Furthermore, it does not make sense in terms of creating a positive impact on society do not pay for people's work when this is possible. Another objective value is the number of beneficiaries used to measure the SEIs' scale (Ciccarino, Rodrigues & da Silva, 2021; Bosma *et al*, 2016). It is a PIS investment criteria as shown in the last section.

The subjective social value is an analogy. The social problem can be seen as a pain (Hadad and Găucă, 2014) and SEI's performance as a protocol to create relief (Cannatelli, 2017; Bacq & Eddleston, 2018). The combination of pain and relief scales provides a good perspective on the treatment evolution. In medical terms, intense pain must decrease 84% to achieve relief (Stahmer *et al*, 1998). The pain-relief scales can also highlight the beneficiary's use-value (Bowman & Ambrosini, 2000). Therefore, it enables to compare the effectiveness of the solutions regardless of the type of social problem involved (Ciccarino, Rodrigues & da Silva, 2021).

2.5 Social innovation

Innovation generally involves poorly structured problems, which do not have an obvious solution within the knowledge available. The solution is usually evolutionary (Dosi, 1988). Social innovation aims to address social problems and needs, which happen regardless of economic results odds (Caroli *et al*, 2018; Phillips *et al*, 2015). Social innovation can be a community-based solution and can emerge from the synergy of different stakeholders to sustain effective social change (Símon-Moya & Revuelto-Taboada, 2012). It also can be about the best resources-use and cost reduction, mainly in a business model viewpoint (Khan, 2016). The cost reductions perspective is about savings, including govern social costs (Cabral *et al*, 2019). Social entrepreneurship has the potential of creating and validating new business models (Símon-Moya & Revuelto-Taboada, 2012) avoiding the tension between social and economic goals by developing them in a complementary way (Defourny & Nyssens, 2010). Business models can be innovations or be a factor for the innovation success, as they ensure the best use of the structure and strategy to make innovation marketable (Teece, 2010; Osterwalder & Pigneur, 2011).

A community-based solution is embedded in its existing social structure and is managed to pursue the economic and social goals to benefits the community over time. The solution does not exist out nor without the community. Furthermore, sustainable local development happens even in poorly situations (Peredo & Chrisman, 2006). This type of innovation is related to an entrepreneur's awareness of the social problem, often linked to personal experience and knowledge, which enable him to mobilize and combine resources efficiently to overcome difficulties (Zahra *et al*, 2009; Mair & Marti, 2006). Besides that, social entrepreneurship takes advantage of entrepreneur's greater ability to identify, evaluate and explore opportunities even with limited resources (Baumol & Strom, 2007; Zhara *et al*, 2009; Hitt *et al*, 2011), that would rebuff conventional entrepreneurs (Lumpkin *et al*, 2013). There is a mobilization capacity moved by moral imperatives that is part of social activism (Snow & Benford, 1988). It is a motivational advantage linked to social goals (Grant, 2008; Dess, 1998) that can emend the resource scarcity and social goals difficulties (Zahra *et al*, 2009; Hadad & Găucă, 2014).

3. Methodology

This study provides examples of Portuguese social innovation highlighting social entrepreneurial and innovation features while contextualize theory (Eisenhardt, 1989; Ghauri, 2004). It starts from the acknowledgment of what does motivate social investment (Ciccarino & Rodrigues, 2019; Ciccarino *et al*, 2019) to enable a better fit between investor's goals and SEI proposal. The selected SEIs are revealing cases and help to understand the outcomes of investment criteria and to examine theoretical features. The SEIs selection criteria for this study were: 1) must have in-depth semi-structured interviews recorded; 2) chosen to identify themselves in the online survey (i.e. it was not mandatory); 3) must have different social value. Therefore, the study was carried out by detailing three cases, hereinafter referred to as SEI1, SEI2; SEI3. The original database has 52 of the 120 SEIs supported by PIS on the date, November 2019. The data were collected from June 2019 to February 2020 by semi-structured in-depth interviews and online survey (Remenyi *et al*, 1998). The theoretical foundation and PIS's investment criteria provided the content analysis categories that were applied by thematic criteria (Bardin, 1977). Data analysis were performed by pattern matching. A pattern is something that happens systematically both in the literature and in the data. The conclusions are based on systematic recurrence until theoretical saturation is reached. Finally, the SEIs were compared (Ghauri, 2004; Remenyi *et al*, 1998; Eisenhardt, 1989).

4. SEIs' presentation

SEI1 is from a traditional, more than a century old not-for-profit organization coordinated through projects (SEIs). The one analysed was a turning point to the organization's start to innovate. Although they are very proud of their innovative capacity "*Certainly the man who started the organization was a social innovator of the 19th century, only the title did not yet exist*". They deal with social problems in an artistic way. The SEI1 has a certain dependence on public funding, despite the organization has varied revenue sources. Its impact assessment relies on quantifiable outcomes and on its beneficiaries' testimony (storytelling) built from a close and lasting relationship. The SEI1 operates regionally and has increased its beneficiaries' number since PIS investment.

SEI2 is from a new organization that works with different projects for different target audiences (SEI). The business model is a traditional not-for-profit one. The organization creates partnership networks according to the project and it is the most dependent on public funding. It acts locally embedded and deals with a specific and neglected social problem. However, its value proposition is not based on the target audience protagonism nor on local capacity. The intermediation carried out with the specific target audience is the SEI2's main differential. The SEI2's target audience would be served even if it did not exist, however, the relationship of trust, understanding, and proximity would not be possible. SEI2 has kept its beneficiaries' number after the PIS investment.

SEI3 is mature and has a social business model despite it has emerged from the most traditional and philanthropist way possible. It has a core business with clearly defined processes and goals. New SEIs are complementary to the core business. It has gone nationally, expanding the beneficiaries' number after the PIS investment. It is the SEI with the best systematized social value assessment and with a great capacity to mobilize volunteers. Unlike the others, it claims to have no difficulty in mobilizing and retaining qualified labour. SEI3 is also the only one that claims to have access to bank financing and donations, in addition to receiving support from a social incubator.

5. Discussion

Despite totally different social goals, the innovations of the three selected SEIs are related to institutional voids (Stephan, Uhlaner & Stride, 2015). Although, SEI2 recognizes otherwise, its embeddedness poses a unique way to reach the target audience (Mair & Marti, 2006). In line with the overall database, the three SEIs recognize average support from the government. None of them are comfortable with their access to funding that falls short to achieve their social goals. The SEIs must be innovative to deal with scarce resources (Khan, 2016) to accomplish a sustainable positive social impact (Dwivedi & Weerawardena, 2018; Zhara *et al*, 2009). In line with literature, the social business model (SEI3) has easy access to fund (Dwivedi & Weerawardena, 2018; G8, 2014). The others SEIs have organically growth (Hitt *et al*, 2011), and SEI2 is even dependent on sponsorship (Leviner, Crutchfield & Wells, 2006; G8, 2014). PIS allows SEIs to focus on achieving social goals (Cannatelli, 2017) explore opportunities, and reach an appropriate scale (Baumol & Strom, 2007), but this support has a time. None of the SEIs' goals are directly financially sustainable, as the solutions' costs could not be borne by the target audience nor by a specific sponsor (Ciccarino *et al*, 2019). The value proposition diversification by incorporating a monetizable trend would be a solution to diversify their revenue sources (Osterwalder & Pigneur, 2011). As the literature predicts, SEIs rely on partnership networks. Although they recognize that this network is more mobilized than before, it is still far from its potential (Bacq & Eddleston, 2018; Hadad & Găucă, 2014).

Another resource concern are the employees. It is worthy to point out that all three SEIs have small size (Bosma *et al*, 2016), but only SEI1 and 2 have a proportional number of volunteers and employees (Bacq & Eddleston, 2018). SEI3 can mobilize more than 100 times its beneficiaries' number due to its work feature (Snow & Benford, 1988). However, there is a plan disclosed to share the social value with volunteers that can learn and benefit from the experience. In general, SEIs' employees are aligned with their values and committed to social goals. However, the teams have more work than would be suitable, which can limit the extent of the impact on society (European Commission, 2016; Ramos & Martín, 2001). Even though the three SEIs deal with very different goals, whose value could not be directly compared, it was possible due to indicators suggested in the theoretical foundations (Ciccarino, Rodrigues & da Silva, 2021). SEI2 did not reached the relief parameter and only kept the beneficiaries' number after PIS investment. It does not mean that there is no social value. SEI 1 deals with an institutional void and serves a good ratio of beneficiaries while creating paid jobs. The others two SEIs have increased their impact scale due to PIS investment. SEI2 provides great subjective social value and works as a complementary social support in a small institutional void (Erpf & Tekula, 2019). SEI3 has the biggest relief

surplus and accomplish more subjective and objective value while dealing with an institutional void. Different ways to creates social value can serve to different investment aims and target audience. The Figure 2 summarizes the characteristics introduced.

	SEI 1	SEI 2	SEI 3
Maturity	Traditional SEI (over 100 years old)	New SEI	Mature SEI (over 5 years)
Organization form	Non profit organization	Non profit organization	Social business (for profit)
SEI kind	The SEI is an initiative among many carried out by the organization	The SEI is an initiative among many carried out by the organization	Core business
Impact range	Regional action	Local, in a specific community or group.	National action
SEI size	Lean team	Lean team	Lean team
Human Resources	Proportional volunteers to paid employees	Proportional volunteers to paid employees	Grande mobilização de voluntários (100 x o número de funcionários)
What happened after the PIS investment	The beneficiary's number has **increased,** maintaining the same geographical coverage.	It has **kept** the beneficiary's number	The beneficiary's number has **increased** when spread to other geographical areas.
Social value created	It provides less subjective social value, although dealing with an institutional void and serving a good ratio of beneficiaries while creates paid jobs.	It provides great subjective social value, although dealing with a small institutional void. It also serves fewer beneficiaries and creates fewer jobs.	More value in general (subjective and objective) and deal with a neglected problem (institutional void).
Pain x relief ratio*	Surplus of 16% relief	Déficit de 8% de alivio	Surplus of 32,8% relief

* 84% reduction in severe pain (> 5) creates relief (Stahmer et al, 1998). All SEIs in the database deal with severe social pains.

Figure 1: SEI's comparison

The correct evaluation of social value through a systematic routine is fundamental to access funding. Only SEI3 has overcome the quantification assessment and is investing in the evaluation improvement. Maybe because of scarce resources and huge work to be done SEI1 and 2 still have basic evaluation routines. However, these SEIs have an embedded approach benefiting from storytelling. Figure 2 poses evidence about these differences.

SEI 1	"I measure the impact practically every week with messages that I receive from beneficiaries (...). The family members continue in touch as if I was part of their family. (...) I know that the project needs it, that society needs it."
SEI 2	"(...) what we do here is at the local level, but it is important to measure the impact we have on people's lives". "(...) on a quantitative level, it is very difficult to do. What we can do is the service we do, the number of activities we did and that, we counted, and the number of daily participants we had, we counted it all."
SEI 3	"The next challenge will be very much focused on looking for this indicator. And in the search for how we create value. It is one of the parts that we will want to implement in the growth plan. And we already have a company that is giving us this consultancy. "

Figure 2: Social value assessment

The main convergence point among the SEIs studied is social innovation. In addition to being the main PIS' selection criterion, the SEI's solutions are innovative in many ways as shown in Figure 3. It was not possible to point out evidence of a community-based solution (Peredo & Chrisman, 2006) nor Business model innovation (Osterwalder & Pigneur, 2011). It's interesting to highlight that there is evidence of the "Bees in the trees" success (Moulaert *et al*, 2017) that means that PIS is renewing traditional structures and boosting ecosystem innovation (Defourny & Nyssens, 2010).

Innovation features	SEI 1	SEI 2	SEI3	References
Deal with a neglected problem	X	X	X	Stephan, Uhlaner & Stride, 2015
Synergy of different stakeholders		X	X	Zahra et al, 2009
Mobilization capacity			X	Snow & Benford, 1988
Best use of resources	X	X	X	Khan, 2016
Social cost reduction	X			Khan, 2016
Aim to solve specific social problems	X	X	X	Ciccarino & Rodrigues, 2019; Zahra et al, 2009
Aim to change society				Ciccarino & Rodrigues, 2019; Erpf & Tekula, 2019; Zahra et al, 2009
Small scale improvement	X	X		Erpf & Tekula, 2019; Zahra et al, 2009
Large scale improvement (national, international)			X	Ciccarino & Rodrigues, 2019; Zahra et al, 2009
Social improvement expanding care and services		X		Erpf & Tekula, 2019; Zahra et al, 2009
Social and economic goals complementary value proposition				Defourny & Nyssens, 2010
Entrepreneurial opportunities viewpoint			X	Hitt et al, 2011; Zhara et al, 2009; Shane & Venkatraman, 2000
"Bees in the trees" process	X	X		Moulaert et al, 2017

Figure 3: Evidence of social innovation

6. Conclusion

This study accomplished the aim to offer comparative cases from a pioneering social innovation public policy (PIS) carried out by Portugal. The SEIs were extracted from a broad previous study by meeting the selection criteria. They serve as revealing cases of different social values, enabling comparison. Thus, they represent PIS investment criteria and reinforce theoretical features that lack empirical evidence (Rawhouser, Cummings & Newbert, 2019; Bosma et al, 2016). Increasing the knowledge is a way to build more suitable support structures (European Commission, 2016; Myrah & Odinsky-Zec, 2013).

There is evidence of PIS investment positive influence by reinforcing network, providing support, and increasing SEI's impact scale (Cannatelli, 2017). PIS links investors and SEIs and helps to structure SEI in a sustainable way. Thence, PIS works as a social innovation promoter and consequently boosts social well-being. The SEIs analyzed endorses PIS's innovative potential to foster the entrepreneurial ecosystem (Moulaert et al, 2017). This study poses a benchmarking by describing investment criteria and presenting their theoretical context (Ciccarino & Rodrigues, 2019; Bosma et al, 2016). Thus, helping disclosure and PIS stakeholders' expectations management (Barki, Rodrigues & Comini 2020). It also poses a new way to identify and compare different kinds of social values. Therefore, it contributes to enhancing literature by providing the empirical evidence that still lacks in it (Rawhouser, Cummings & Newbert, 2019; Bosma et al, 2016).

The study covers the way social innovation is discussed. All SEIs somehow fulfill an institutional void (Stephan, Uhlaner & Stride, 2015), and shows a capacity to mobilize and combine resources efficiently (Zahra et al, 2009; Mair & Marti, 2006). The SEI2 provides its embeddedness poses a unique way to reach the target audience (Mair & Marti, 2006) what is part of a community-based mobilization (Símon-Moya & Revuelto-Taboada, 2012). Unfortunately, not enough to point out a community-based solution (Peredo & Chrisman, 2006). Evidence was also insufficient to describe business model innovation (Osterwalder & Pigneur, 2011). Further research can explore these trends within PIS. It is also important to verify how SEIs are doing after the investment life cycle and if they accomplish financial sustainability (Dwivedi & Weerawardena, 2018). Better understanding and describing the "Bees in the trees" in the Portuguese context would be nice as well (Moulaert et al, 2017). It would allow a better understanding of the traditional organizations' adaptation and their innovation process (Ramos & Martín, 2001; Dees, 1998).

As benchmarks, the study highlights that SEI1 and SE2 have organic growth (Hitt et al, 2011), thus have less structure to enable easy access to fund like SEI3 (Dwivedi & Weerawardena, 2018; G8, 2014). It is a huge concern because PIS investment has a cutoff date and none of the SEIs' goals are directly financially sustainable to guarantee their survival and their social impact continuity (Ciccarino et al, 2019). They must seek for solution to diversify their revenue sources (Osterwalder & Pigneur, 2011), especially because their network is still not strong enough to enable synergies that make up for this business model weakness (Bacq & Eddleston, 2018; Hadad & Găucă, 2014). The study showed a strong mobilization capacity (Snow & Benford, 1988) even for small-size initiatives (Bosma et al, 2016), but also highlights concerns about human resources suitability (Bacq & Eddleston, 2018; European Commission, 2016; Ramos & Martín, 2001).

Although SEIs create different social values, SEI3 and SEI2 are more respectively more effective in doing it (Ciccarino, Rodrigues & da Silva, 2021). Yet, SEI2 provides great subjective social value and works complementing the social support in a small institutional void (Erpf & Tekula, 2019). Finally, PIS and its social investments can be a hope to build new ways of doing business (Seelos & Mair, 2005) and refresh social structures (Stephan, Uhlaner & Stride, 2015; Hoogendoorn, 2016). Research the Portuguese social economy in-depth can be a source of inspiration and best practices.

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The Impact of Artificial Intelligence on Innovation Management: A Literature Review

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Abstract: The digital transformation and its accompanying artificial intelligence processes are becoming the essential focus of the contemporaneous digital revolution. Its real impacts, challenges, and opportunities on the industry and the business environment remain unknown. In this context, innovation has become the main driver of competitiveness. Nevertheless, innovation is no longer an isolated and residual agent but a crucial mindset that should be embedded in all workers and all activities of a company, as innovation can improve an organisation's performance and the employees' well-being and working conditions. In this context, the growth of artificial intelligence in the business world seems to be changing the way companies innovate and manage innovation processes. This paper presents a literature review study whose objective is to get insights into publications that relate innovation management and artificial intelligence. The method used in this study is based on the analysis of data obtained from the Scopus database. As a general insight, it is concluded that AI systems can free managers from more technical and exhaustive research tasks and enhance creative processes. This way, managers can focus more on creativity applied to problem-solving and the conception and development of innovation strategies. In terms of originality, this study aims to contribute and stimulate data-driven discussions regarding the possible impacts of artificial intelligence on innovation processes. This study also explores directions for future research.

Keywords: innovation management, artificial intelligence, innovation models, AI challenges

1. Introduction

The changes in society, resulting from the challenges arising from sustainability and the digital transformation, are putting a great pressure on competitiveness.

Academics and managers have long been discussing the importance and role innovation management plays in the competitive advantage and organisation's growth.

Knowledge production and research within the field of innovation management are accelerating at a fast pace while at the same time remaining fragmented and interdisciplinary. This reality creates a challenge in narrowing and keeping up with data collection, evidence, and studies in this specific area (Snyder, 2019).

To examine the vast amount of data published until the present, a literature review was elaborated as a research method to understand and evaluate what has been written, especially in the last ten years. This analysis is fundamental to clarify and define such a broad concept such as innovation management and artificial intelligence. A relation between the concepts can be more concretely established and studied. Furthermore, what are the gaps and important aspects yet being explored or missing in the literature? At last, a review was conducted on how artificial intelligence presence affects and changes innovation management procedures and models within companies nowadays.

Data were collected mainly from Scopus. This database was chosen because of the availability of different publications' analysis regarding authors, citations, and sources. Another factor was the up to date and relevance of the available articles.

The research process was elaborated using the keywords “Innovation management” and “Artificial Intelligence” in the academic and business sphere.

2. Literature review analysis and discussion

2.1 Innovation management definition

Despite the significant volume of publications available in academic research databases such as Elsevier Scopus about innovation management until the date, the year 2000 was when the number of articles about innovation increased more significantly. This was probably due to the growing interest of academics and firms regarding the subject and also the technological advancements. Being the USA followed by Germany, the countries with more publications on the subject of innovation management.

The number of articles published regarding innovation management has continued to grow steadily in the last decade. In Scopus, there were published 2013 articles related to the subject from 2016 until May 2021.

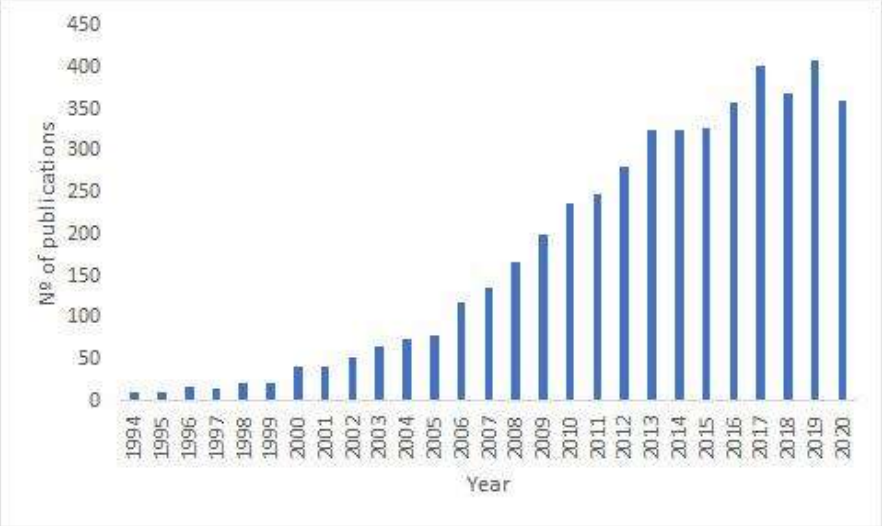

Figure 1: Evolution of the number of articles published in Scopus throughout the years Source: Elaborated by the author

A considerable literature was found and analysed for this research on the topic of "innovation", its origins and history. At first, the literature seemed rich and vast. However, since this research focuses not on "*innovation*" itself but on innovation management models, the author could verify a fragmented and diverged literature.

The lack of a generally accepted definition is partially due to the ambiguous nature of the concept of innovation itself and the field's multidisciplinary nature (Lopes et al., 2017).

There are measures of innovation management frequently proposed that respond to some needs of both companies and researchers to understand the application and effectiveness of innovation; however, this information is fragmented (Adams, Bessant & Phelps, 2006).

When analysing innovation from the perspective of the innovation management concept, there is some consensus that despite its diversified character, innovation management is an important mechanism for the competitiveness of companies and countries (Narciso, Canen & Tammela, 2018). Innovation capability can and should be conceptualised and measured (OCDE, 2018) since it holds the potential to create novelty and knowledge (Zheng, Liu & George, 2010; Lawson, & Samson, 2001). There is also the consensus among authors that innovation management has been received increasing attention in the operations management field during the last years. Academics and managers have been discussing and analysing the definition of innovation management and its importance for the organisation's growth and competitive advantage.

Innovation applied to management and organisations is much more complex than the simple meaning of "creating something new", as the definition of innovation implies and covers a considerable diversity of phenomenon perspectives. Therefore, before proceeding with the present analysis, it is relevant to establish the complex and multidisciplinary nature of innovation management topic. Moreover, due to its multiple distinct layers and dimensions, it is not possible to achieve one definition. However, through the complementary

contributions of different authors and frameworks, it becomes possible to establish common innovation determinants and develop guidelines for each supply chain activity under the umbrella term of innovation management.

Another issue that remains unsolved is how to recognise what type of innovation management is necessary for each company's activities and departments. There are difficulties in establishing concrete guidelines and procedures for each of the activities. One of the reasons for this problem are the different dimensions that innovation can address, such as technological; organisational, process, product. Besides, the differences between sustaining and disruptive innovation or incremental versus radical innovation lead to different management methods.

Innovation management includes changes in the "how" and "what" managers implement in preparing guidelines, creating resolutions, managing events and how they motivate individuals. Innovation is essential both at the individual and organisational levels for the evolution of the business environment. Innovation can be an upgrade in performance and procedures adopted by an organisation or (Pfeffer and Sutton, 2000).

Before the 2000s, there seems to be a lack of consensus on innovation management as a concrete and defined discipline transversal and applicable to all activities within the organisation.

Chesbrough (2003) opened the way for the open innovation model with many scholars considering that his contribution created a new paradigm for analysing the innovation process. Open innovation encourages companies to open up their innovation processes, giving up their closed and hierarchically rigid processes. The author defines innovation as a process of information creation only possible to be developed out of social interactions. Thus companies cannot rely only on internal resources and knowledge anymore. They have to look outside and try to identify new skills and knowledge to complete their own. The ability to innovate combining internal and external knowledge is becoming one of the most critical aspects that lead to a sustainable competitive advantage (Lopes et al., 2016).

This new approach has contributed to changes in companies' dynamics, either internally (changing behaviours towards innovation and the way people and departments interact) and externally, changing how they gather information and relate to other organisations (Trott, 2017; Chiaromonte, 2004).

2.2 Artificial Intelligence

Although the concept of Artificial Intelligence has started to be developed throughout the 20th century, its exponential growth happened only at the beginning of the 21st century.

Scientific publications date back decades, but the boom in published literature related to Artificial Intelligence started only around 2001 (WIPO, 2019).

In the Scopus database, during the 1990s the number of publications regarding AI was approximately the same each year. From the beginning of the year 2000 and onwards, there has been a steady growth in the number of publications per year.

This research focused mainly on literature published in the last five years. From 2016 to 2020, there are 129,114 publications available related to "Artificial Intelligence" in the Scopus database.

However, when the research words are “Artificial intelligence definition”, there are only 72 related articles published in the Scopus database since 2000.

Establishing a comparison, in 2013 there were published only three articles related to the definition of Artificial Intelligence, whereas in 2021, there are already 26 published in the Scopus database.

We can conclude that there has been very significant growth in the number of articles published related to Artificial Intelligence in the last 20 years.

The concept of Artificial Intelligence is very broad and not fully defined and understood in the literature, despite the great volume of articles published in a vast range of fields and business activities.

Modern Artificial Intelligence (AI) research began in the mid-1950s, with a conference at Dartmouth College that led to a great enthusiasm in the area among scientists and researchers. From that time, AI laboratories soon were created at major universities and institutes (Oliveira, 2017).

In the 1950s, the term "artificial intelligence" was originally used, to describe the simple idea of human intelligence being exhibited by machines. Although this assumption might not be very accurate, since computers use techniques to solve problems differently, human brains process information to solve the same problems.

For instance, a chess player AI system use speed to evaluate millions of positions per second – a strategy not possible to be used by a human chess player (Oliveira, 2017; Muthukrishnan et al., 2020).

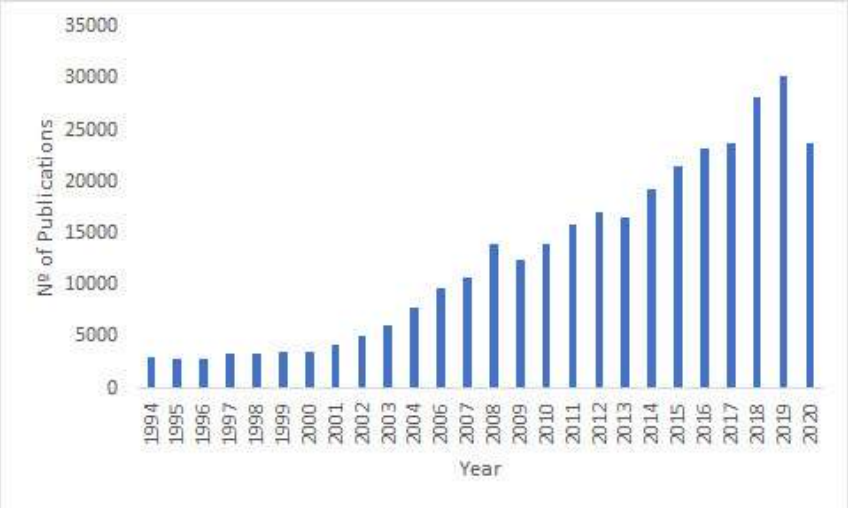

Figure 2: Evolution of artificial intelligence publications throughout the years in Scopus. Source: elaborated by the author

Some authors have theorized that there are challenges for achieving Artificial *Wisdom* because of its intrinsic nature.

The principal reason for this challenge lies in the philosophical distinction between practical wisdom and practical intelligence. Hacker-Wright (2015) explains that instrumental rationality or cleverness is getting the aims right rather than reasoning well to fulfil aims. Skills are the instruments of rationality, while practical wisdom demands to reflect about what end to follow. Therefore, an agent is wise if he can deliberate well about the final goals of the domain (Tsai, 2020).

Despite the challenges of inspiring Artificial Intelligence in human reasoning, the literature shows some degree of consensus about the use of AI in practical intelligence, which is the construction of programs that mimic the behaviour of human intelligence step by step using deduction, reasoning, planning and scheduling. Even though scientists were able to develop AI systems that perform some tasks, there are many difficulties researchers face behind the creatin of models based on the human reasoning, since many activities of our daily lives are intractable and computationally hard to formulate.

Alan Turing, widely considered the father of the modern computer, anticipated some of the objections to its own AI definition present in the known Turing test.

Since the Turing test forces the computer to imitate human behaviour and has to possess human-like reasoning, nowadays researchers agree that the test has some limitations as it is difficult to apply in today's most advanced AI systems.

For now, the absence of emotions can be used to differentiate AI from human intelligence, even though computers might be able to interpret human emotions and feelings in the future (Oliveira, 2017; D'Acquisito, 2020).

When analysing the literature, it is possible to verify a general agreement regarding AI being a term used as an "umbrella" that includes many sub-areas such as machine learning and deep learning.

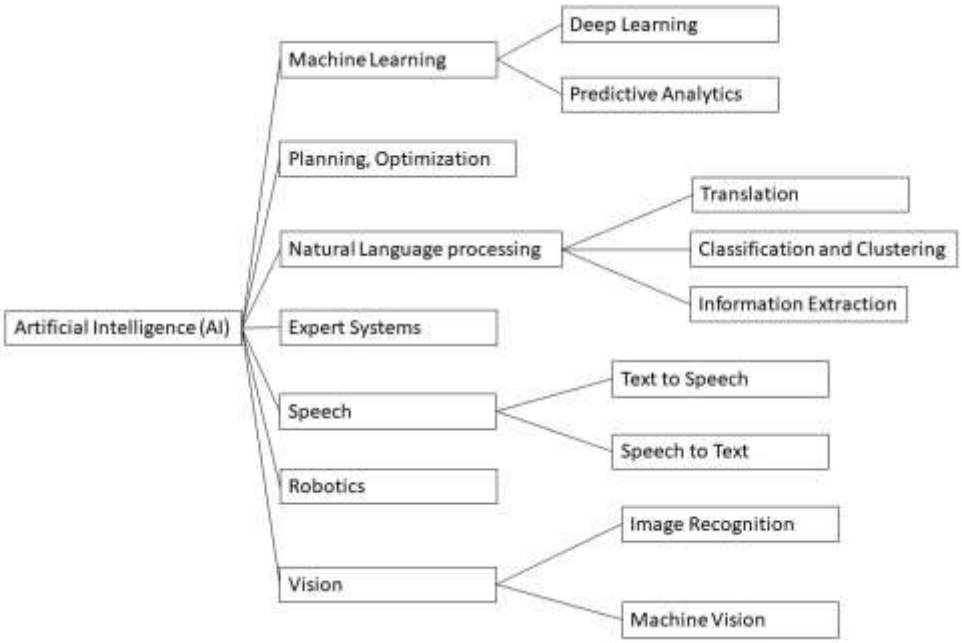

Figure 3: Artificial intelligence subfields. Source: Elaborated by the author

Artificial intelligence stands within technological innovation, but it is transversal to all activities such as research and development, financial and commercial ones. These systems are already considered "a general-purpose technology" and will likely be an important component of future work. (Hilb, 2020; Ghosh et al., 2019).

2.3 Impact of AI on innovation management

There is little empirical work published on the impact of AI and the challenges it brings to innovation management to date. It contrasts with the great amount of investment in studies about the overall potential of AI technologies, not only published by academics but also consulting firms (Prem, 2019).

In the Scopus database, when using the research words "Artificial Intelligence and Innovation", there were 37 publications, being the first one published in 2006.

In the same database, when the research words were "Artificial intelligence impact on innovation", there were no results available to date.

There were available 191 results on google scholar regarding "Impact of Artificial intelligence on Innovation" in the last five years.

Though innovation is quite complex to achieve for every organisation, studies show that organisations are looking towards IT as an enabler of process innovation (Anand et al., 2013).

Recently, researchers have shown some interest in AI and machine learning possibility of replacing humans and taking over the workplace roles, changing the organisational structures and processes. The amount of literature on this subject has been growing steadily in the last years (Brynjolfsson & McAfee, 2017).

Some authors believe that the baseline for organizations' competitiveness lies in information treatment and problem-solving capacities. In this context, the big data field plays a crucial role in the success of AI. In fact, there is a reciprocal relationship between Big data and AI, as the latter depends on the former to succeed while helping

organizations to unlock the potential into their data sets. AI systems can help innovation managers process much larger amounts of information than humans could possibly do on their own, adding that AI algorithms perform at a great speed, impacting the learning process momentum.

Current most advanced AI systems rely on deep neural networks that need and are able to process vast amounts of data at a great speed. Some research tools based on algorithms have changed the nature of research in some fields but still lack generality, as these types of algorithms do not have possess yet a wide applicability outside a certain domain (Cockburn, 2018).This fact is creating a phenomenon that Porter and Heppelmann (2017) describe as a disconnection between the huge amount of digital data available nowadays and the physical world's limitations, in which information can be applied.

Suppose AI systems play a crucial role in collecting and analysing data. If advances in deep learning reach a new general-purpose internal market information (IMI), there will be a significant impact within companies.

In that case, the way innovation is organised and its processes need to be challenged and adapted to the introduction of AI because those systems have important cost advantages in information processing (Haefner, 2021). Artificial intelligence has not achieved general intelligence yet, since most AI systems used nowadays display narrow intelligence in the sense that are highly efficient in one or two tasks. Even though they already excel largely human abilities in processing information in the area of idea development.

In the innovation processes' stage of design thinking and implementation, AI can support managers in developing ideas and solutions. These developments are already creating significant value for companies (Roose, 2019 cited by Haefner et al., 2021).

To support the above affirmation with empiric evidence, there are some examples of AI applications. One of them is AI use to optimise battery components and solar cells by machine learning-based methods used to predict the most promising materials, speeding up the innovation process (Charington, 2018).

Another example is the business analytical tool application developed by Outlier (2020). The firm uses machine learning algorithms to process raw metrics data into information that humans can read. After analysing the company's data, Outlier generates a set of resumed customised insights and “stories”. In doing so, these AI systems improve managers capacity to spot opportunities and come up with innovative ideas in many activities. This AI system is transversal to many sectors (Haefner, 2021; Outlier, 2020).

Artificial Intelligence is part of the technological revolution and influences all activities of a company's value chain: Products and services, production processes, employment and human resources. Some authors agree that AI also has the potential to reshape how innovation processes and R&D are organised, having the potential to change innovation nature (OECD & Eurostat, 2018; Cockburn, Henderson & Stem, 2018; Haefner et al.,2021).

Cockburn, Henderson and Stern (2018) are a few of the researchers that have focused on the potential of recent developments in deep learning to serve as a general-purpose method of the invention (Agrawal et al., 2017).

Despite the lack of data on the subject of AI impact on innovation management, some authors have found some qualitative evidence about the repercussions of deep learning multi-layered networks in a range of tasks that include computer vision and other prediction tasks. AI expert on deep learning Geoffrey Hinton (2020) suggests some great and rapid advances in the last few years on small algorithms related to multi-layered neurol networks. These last developments on AI make some researchers believe that a new method of invention was created: machine learning. Despite its early stages, the potential of machine learning and deep learning might create a new revolution when focusing on the organisational and policy consequences of AI. If there are increasing valuable outcomes in the scope of data acquisition that firms can obtain and use, it is possible that new and aggressive entrant companies in a particular sector might be able to create a significant competitive advantage over potential larger and older rivals. Merely because of control over data and not the usual formal intellectual property or demand network effects. This possibility can shift the way companies innovate. Even though, pressures and incentives to keep data private will weaken new entrants and researchers' ability to study (Cockburn et al., 2018; Oliveira, 2017).

Algorithms should help managers make better decisions, generating a shift in which a large amount of data complex connections helps in the decision process. These mathematical models simplify work and can catalogue and organise information sets so that some models are more efficient than human decisions (Sousa & Rocha, 2019).

Machine learning as an invention of a method of inventing might not only have an impact reducing costs of innovation activities, but it can generate a new approach and mindset towards innovation. A conceptual framework that integrates AI tools can lower costs on research.

Some AI innovations improve access to knowledge within the research activities and contribute to "lab productivity."

Some authors stress that the economic impact of some research tools is not limited to reduce the costs of specific innovation activities. From an organisational perspective, probably there will be significant changes towards research. Taking advantage of the combination of large datasets and deep learning algorithms will create complex interdependencies also affecting interactions and communication among departments and workers. Changing the way organisations process information to a more inclusive and less centralised way, as workers who were not involved in the innovation processes in the past become part of it (Haefner, 2021).

Also, there is likely to shift from a more routinised labour-intensive research effort (testing hypothesis in small purpose-built datasets) towards research that takes advantage of large datasets and enhanced prediction algorithms in the organisation.

2.4 AI challenges

In order to understand AI capabilities' potential in assisting humans in the innovation process, it is important to understand some key technical features of those systems that are usually constrained by human capabilities. AI systems are created by humans who establish objective functions generally sparse since human researchers who are programming the systems could not know all managers' objectives. The same happens for AI applications solution space, which is also pre-defined by humans; thus, current AI systems tend to have a limited ability to explore the solution space autonomously (Haefner et al., 2020).

Also, some skills have not yet been acquired by machines, such as creativity, imagination and critical thinking (Deng et al., 2020; Elish & Boyd, 2019). Thus, they have a supporting function but not over the entire innovation process for now, as it is improbable that whole series of connected tasks can be totally automated.

The lack of IT and AI experts is one of the biggest challenges for companies, as most firms' human capital lack those skills. Even recent computer science graduates still do not possess enough expertise (European Commission, 2019).

Another barrier is the costs of creating the required know-how for innovations, as AI techniques require many trial and error cycles during the development process.

The lack of technical predictability can challenge innovation management if expectations are high about AI possibilities. Experts warn about the danger of disappointment of the modest performance of AI solutions. The disappointment might mean that companies delay too long to explore potential solutions (Penn, 2019; Haefner et al., 2020).

Another concern regarding deep learning as a general method of innovation as to do with the large and unstructured databases that provide information but might rise competition-related issues. Companies that have control over larger datasets can gain a crucial advantage and a persistent innovation advantages over data that is independent on traditional economies of scale. Data pools that are essential to generate predictions and produce information, might be public or private. And so, the access to them will depend on organizational policies and boundaries. This might change the dynamics of market structure (OECD 2018; Cockburn 2018).

Damioli (2021), explores the difficulty in identifying patents related to AI technologies. Since there is no established definition of AI given its many disciplines and its rapid evolution in the last years, adding its the

general-purpose nature transversal to many activities. The fact is, AI brings the digital connection among robots, sensors and big data in order to optimize better the production process.

3. Conclusions and trends

This exploratory article has provided an overview of AI and Innovation. Despite its rapid evolution in the last years, AI is still in its initial stage, the information is scarce, and that needs to be more studies.

The potential of AI and the increasing investment of companies, especially large ones, there is evidence that firms do not experience rapid beneficial outcomes, ending up blaming AI initiatives as a possible failure. AI systems are impacting product and process quality, decreasing de-routinisation of jobs and allowing managers to be more focused on creativity and conceptually related tasks.

Artificial intelligence is being progressively included in companies' activities, but there are many challenges businesses face. Authors stress that Artificial Intelligence systems need to be seen and adopted from the perspective of business capability as a general innovation method. Nevertheless, for AI potential no be missed, companies will need to invest more in employees' skills and improve their capabilities of key employees like data scientists, who have statistical and big data skills.

For last and establishing the linkage between AI and Innovation Management, European programs have put Artificial Intelligence on top of their agendas, with the European Commission (2018) encouraging countries and companies to step up investment in innovation and research on Artificial Intelligence.

Also, there are risks of losing out on the opportunities offered by AI, which can have consequences for Europe by becoming consumers of solutions created elsewhere. Therefore, the EU should become a research powerhouse applying innovations in the market.

According to this research, the following trends were identified in artificial Intelligence and innovation management:

- Open innovation models
- Prevalence of Incremental innovations
- Cooperation among companies

Although limited in its conclusions, this work opens the way for more detailed research that will consider an empirical analysis of the application of these concepts in the business context.

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Corporate Entrepreneurship in the Digital Age: A Systematic Literature Review

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Abstract: This paper aims to systematize the extant literature on Corporate Entrepreneurship (CE) and to guide future research on digital corporate entrepreneurship. CE, or entrepreneurship in established organizations, has been a topic of interest to scholars and practitioners for over 40 years. Increasing research is confirming the relevance of CE as an essential strategy for corporations to stay competitive in the current ever-changing global environment. In the digital age, (corporate) entrepreneurship is now more in demand than ever before. Digital technologies can make CE increasingly potent and prolific and redesign the traditional ways of exploring and exploiting entrepreneurial opportunities by large and established organizations, reshaping the traditional CE. Despite the considerable scholarly discussion on CE, little research was placed in organizing the body of knowledge on CE in terms of theories and practices. This results in a scattered and fragmented literature. Thus, a systematization and integration is needed. Furthermore, although the body of research on CE has attracted an increasing amount of attention along the years and despite the importance and pervasiveness of the digital technologies, the profound impact of digital technologies on CE has yet to be addressed. In light of these considerations, a systematic literature review on CE studies, based on 132 academic journals and conference proceedings published between 1983 and 2021, was performed. This study provides theoretical and managerial implications. First, the review provides an overview on how the topic has evolved over time, through a systematization of CE terminologies, definitions, conceptualizations and theories. Second, the review revises the extant knowledge on CE considering the digital perspective, shading lights on how the digital technologies are reshaping CE theories and practices. Suggestions concerning the future direction of research in the emerging field of digital corporate entrepreneurship are also proposed in the form of research questions that are valuable for both academics and managers.

Keywords: corporate entrepreneurship, systematic literature review, digital technologies, digital entrepreneurship, digital corporate entrepreneurship

1. Introduction

CE, or entrepreneurship in established organizations, has gained relevance in research as well as in practice. Increasing research is confirming the relevance of CE as an essential strategy for corporations to facilitate firms' efforts to create innovation and cope effectively with the current competitive environment (see Figure 1). In a dynamic and uncertain environment such as that created by digital transformation, firms need to constantly innovate to survive. Due to the increasingly turbulent and competitive environment, firms have been looking for new ways to be more entrepreneurial and generate competitive advantage. In the digital age, (corporate) entrepreneurship is now more in demand than ever before. Digitalization is considered one of the most importance force in entrepreneurship (Berger et al, 2019) and digital technologies, can make CE increasingly potent and prolific (Arfi and Hikkerova, 2019). Digital technologies can herald a new era in CE in which the traditional ways of exploring and exploiting entrepreneurial opportunities by large and established organizations are increasingly questioned and redesigned, reshaping the traditional CE. Despite the considerable scholarly discussion on CE, little research was placed in organizing the body of knowledge on CE in terms of theories and practices. This results in a scattered and fragmented literature. Indeed, although several reviews on CE have been appeared in management journals, they seem to be not much focused on theories. Thus, a systematization and integration is needed. Furthermore, despite the importance and pervasiveness of the digital technologies and the multiple digital transformation initiatives undertaken by established firms, the profound impact of digital technologies on CE has yet to be addressed and practitioners have limited guidelines for fostering entrepreneurship in large organizations (Soltanifar et al, 2021; Ghosh et al, 2021). In light of these considerations, a systematic literature review (Tranfield et al, 2003) on CE studies, based on 132 academic journals and conference proceedings published between 1983 and 2021, was performed. This study provides theoretical and managerial implications. First, the review take stock and systematizes CE literature around its definitions, conceptualizations and theories. Second, the review revises the extant knowledge on CE considering the digital perspective, shading lights on how the digital technologies are reshaping CE theories and practices. Along with identifying gaps in CE literature, this study proposes an agenda for future exploration. Suggestions

concerning the future direction of research in the emerging field of digital CE are also proposed in the form of research questions that are valuable for both academics and managers.

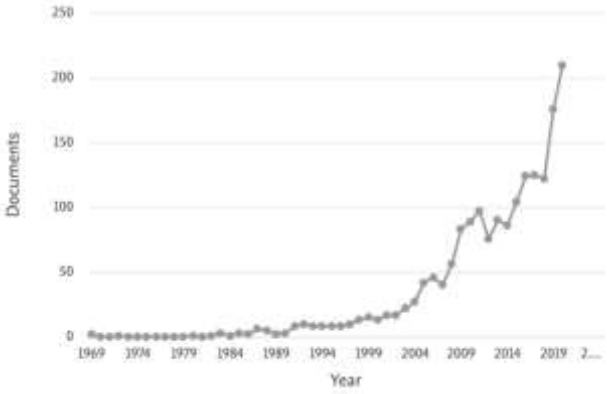

Figure 1: Academic journals and conference proceedings on corporate entrepreneurship in Scopus

2. Setting the stage for the review

In the extant body of knowledge on CE, entrepreneurship in established firms has gone under different labels and terms, such as corporate entrepreneurship (Sharma and Chrisman, 1999), corporate venturing (Biggadike, 1979), intrapreneurship (Pinchot, 1985), internal corporate entrepreneurship (Jones and Butler, 1992), internal entrepreneurship (Vesper, 1984), strategic renewal (Guth and Ginsberg, 1990), and venturing (Hornsby et al., 1993). All these terms describe CE as entrepreneurial efforts within an existing organization. However, various and heterogenous definitions, domains and forms have been proposed to describe CE. This results in a scattered and fragmented literature. Thus, this review is designed to systematize extant literature on "corporate entrepreneurship" around its theories and conceptualizations, and direct future research endeavours. A review on CE is both timely and of interest to academics and practitioners. First, from a theory perspective, while the number of studies dealing with the topic of CE is increasing, little research effort was placed in organizing such body of knowledge in terms of theories and practices. Specifically, limited effort has been done to systematize CE theories that result scattered and fragmented. A systematization and integration is needed. Second, the need for a review is even more urgent and compelling as the digital technologies are creating the conditions to facilitate and empower CE (Arfi and Hikkerova, 2019), running better experiments in scope and scale (Nambisan, 2017). Despite its contemporary significance (Sassanelli et al, 2020), limited attention has been spent in the extant literature in understanding how digital technologies are reshaping CE. Furthermore, it seems that no review considered CE according to the digital perspective. Thus, this review aims to open up further investigations about how digital technologies can reshape CE creating the room for future studies on digital CE, at the intersection of CE and digital entrepreneurship. While there is a growing body of research examining how digital technologies are reshaping entrepreneurship, i.e digital entrepreneurship, there is no corresponding literature investigating the role of digital technologies in corporate entrepreneurship, i.e digital corporate entrepreneurship (see Figure 2).

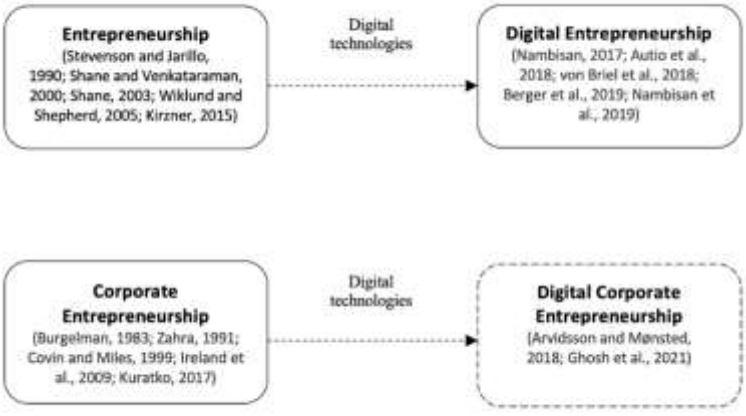

Figure 2: Positioning digital corporate entrepreneurship

3. Methods

The review is based on academic journals and conference proceedings covering CE published between 1983 and April 2021. Similarly, to previous reviews (Ghezzi et al, 2017; Cavallo et al, 2019), and following the Cochrane systematic review method (Tranfield et al, 2003) that finds extensive application in the Medicine field – where search rigor is essential to guarantee robust scientific, the study adopts a multi-step process. The review starts by searching on the SciVerse Scopus online database for academic journals and conference proceedings on CE. Since Scopus is more comprehensive and less selective than, for example, the Web of Science database, this potentially means that a wider array of international publications is searched which, in turn, could be more receptive to the topic under scrutiny.

Moreover, because of the dynamic and growing literature on CE, we decided to review papers published in both academic journals and conference proceedings. This decision came about from the consideration that, in dynamic fields, if the scope of a literature review is broadened by including publications that belong to the "grey literature" (i.e., the heterogeneous body of published material that has not been subjected to the traditional peer review process – Adams et al, 2015), this can lead to the inclusion of novel and relevant findings and avoid the lack of immediacy determined by the lag of academic knowledge (Adams et al, 2016). Since we wanted to focus on CE articles with entrepreneurial implications, while maintaining a broad reach, our search was limited to the subject areas of "Business, Management and Accounting", "Social Sciences", "Economics, Econometrics and Finance" and "Decision Sciences" – thus excluding studies in CE belonging to non-social sciences fields and disciplines. In the first step, the study's research question was stated in line with the aforementioned goal (see Section 2). Our review aims to take stock and systematize the extant CE literature around its theories and conceptualizations. In the second step, eligibility criteria to include or exclude articles from our sample were defined. The following first level criteria determined whether studies were included: (i) the articles had to contain the term "corporate entrepreneurship" in their title, keywords or abstract and (ii) no limitations on the publication timeframe, considering all the articles published in SciVerse Scopus till now, April 2021, since the first article on "corporate entrepreneurship" in SciVerse Scopus, published in 1983, is the seminal paper of Robert Burgelman that provided the first definition of CE. This search resulted in 977 articles gathered. As a third step, we included the articles that met more refined second-level criteria: (iii) they must be relevant, as inferred from their title or abstract, or by examining the full paper; (iv) they must have been published in academic journals and conference proceedings of Scopus, in the sub-subject areas of "Business, Management and Accounting", "Social Sciences", "Economics, Econometrics and Finance" and "Decision Sciences" and (v) they must be written in English. This phase allowed us to reduce the number of papers in the sample significantly, resulting in a working database of 132 articles.

These documents collected were then examined through a comprehensive scheme of analysis or third level criteria (Higgins and Green, 2011) consisting in four different sections: (i) a "demographic" section describing the article information, including descriptive data (e.g. title; year; keywords; author/s; journal; Scopus citations), (ii) a "theoretical" section regarding CE definitions, conceptualizations, theories, (iii) a section collecting all the relevant information regarding the type of study (e.g. article type, research methodology, related theoretical streams and study's main findings) so to describe the nature of the studies present in the extant literature.

4. Review

In line with the aforementioned goal, the review is structured in the following sections: (i) CE definitions; (ii) CE conceptualizations (i.e domains and forms of CE); (iii) CE theories. In light of the aforementioned considerations on digital perspective in CE literature and since the focus on digital technologies is a differential part of this review, we have decided to structure internally each section/block of the review as follows: first, we focused our attention on the "traditional" CE, then on CE analyzed according to the digital perspective, i.e. digital CE (see Figure 3).

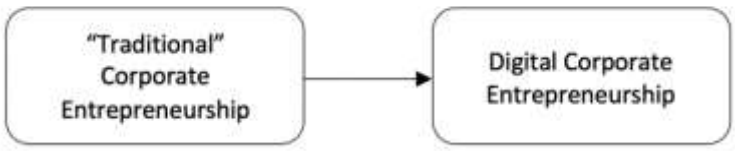

Figure 3: Strategic flow of review

4.1 Corporate entrepreneurship definitions

Different CE definitions are proposed in the literature and there is no consensus on an universally accepted definition of CE. Scholars proposed various definitions of CE that emphasize different aspects of this phenomenon such as diversifying through internal development, developing new products and/ or markets, developing new businesses, innovating for corporate renewal, innovating for organizational renewal, promoting entrepreneurial behaviour within established organizations. A clarification is needed. Among the definitions of CE in literature, Burgelman (1983) provided the first definition of CE as "the process whereby the firms engage in diversification through internal development. Such diversification requires new resource combinations to extend the firm's activities in areas unrelated, or marginally related, to its current domain of competence" (p.349). Starting from this seminal definition, various and heterogenous definitions have been proposed. Among more than 80 definitions of CE identified in the literature, we selected Sharma and Chrisman (1999) definition as the most cited and one of the most established ones that defines CE as "the process whereby an individual or group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization" (p.18). In addition, Sharma and Chrisman (1999) provides an exhaustive picture of CE including the two domains of CE, corporate venturing and strategic entrepreneurship, and encompassing CE both at firm-level and individual-level.

Concerning CE in the digital age, we considered also relevant to focus our attention on the definitions adopted in studies analyzing CE and digital. Simonsson and colleagues (2020) describe CE as how established companies are able to exploit new ideas that differ from their existing offerings, while leveraging existing assets and resources, while An and colleagues (2018) define CE as a set of firm-wide activities that centers on the discovery and pursuits of new opportunities through entrepreneurial activities. These definitions are focused on the concepts of opportunity and on the role of existing resources. Thanks to the use of digital technologies (Nambisan, 2017), existing resources can be used in novel and unpredictable ways (Autio et al, 2018). Concerning the definition of digital CE, our review informs that so far only Arvidsson and Mønsted (2018) tried to define digital CE as "the entrepreneurial action by which organization members identify opportunities and pursue them by recombining resources in such a way that the development and scaling of new applications creates potent stepping stones for further action" (p.371). Analysing this definition, it is possible to notice that there is no explicit reference to digital technologies, and it could be the room to improve it, proposing a new and original definition. We could generally define digital CE as entrepreneurship in established organizations enabled by digital technologies. Furthermore, in the Arvidsson and Mønsted (2018) definition, it is possible to see possible connections with interesting and promising theories to be studied in digital CE, such as effectuation and bricolage. Specifically, a relevant link can be identified between this first definition with exaptation theory (Dew et al, 2004), one of the most potential theories to be studied in digital CE. In the emerging field of digital CE, scholars have started to define the digital intrapreneurship, i.e intrapreneurship in the digital age. Pinchot and Soltanifar (2021) define digital intrapreneurship as "any intrapreneurship that uses digital means as a critical component of its innovation initiative" (p.328-329).

4.2 Corporate entrepreneurship conceptualizations

CE is represented as a multifaced and multidimensional phenomenon. Various CE conceptualizations, i.e domains and forms of CE have been proposed in the literature. A systematization and clarification is needed. The most established CE conceptualizations cited in CE literature are related to Guth and Ginsberg (1990), Sharma and Chrisman (1999), Covin and Miles (1999) and Morris, Kuratko, and Covin (2011). According to Guth and Ginsberg's (1990), CE encompasses corporate venturing and strategic renewal. Sharma and Chrisman's (1999) expanded CE scope also including innovation. The most recent and accepted CE conceptualization (Morris et al., 2011) proposed two domains of CE: corporate venturing, including internal corporate venturing, cooperative corporate venturing and external corporate venturing and strategic entrepreneurship that includes a broad array of entrepreneurial initiatives: strategic renewal, sustained regeneration, domain redefinition, organizational rejuvenation, and business model reconstruction. Morris and colleagues (2011) conceptualization is based on the established Covin and Miles (1999), advanced with the form of business model reconstruction. Corporate venturing and strategic entrepreneurship represent the two established domains of CE and the various conceptualizations proposed in the literature could be reconducted to these domains. Corporate venturing, recognized as the first major domain of CE, includes various methods for creating, adding to, or investing in new businesses (Kuratko, 2017), while strategic entrepreneurship involves simultaneous opportunity-seeking and advantage- seeking behaviors (Ireland and Webb, 2007) and can take one of five forms: sustained regeneration, focused on new products or new markets; organizational rejuvenation focused on

organization; strategic renewal, focused on business strategy; domain redefinition, focused on the creation and exploitation of product market arenas and business model reconstruction, focused on new business models. Considering the digital perspective, digital technologies can reshape the traditional CE forms till leading towards new CE forms. Different scholars (Ghosh et al, 2021) emphasize potential digital technologies that could have a significant impact on entrepreneurship and CE such as internet of things, and augmented / virtual reality, blockchain; big data analytics, cognitive computing. New digital technologies, such as 3D printing and digital makerspaces, enable product and business models to be quickly formed and modified in repeated cycles of experimentation and implementation (Ries, 2011). We believe that organizations need to fully exploit the potential of digital technologies to empower CE forms (see Figure 4) such as intrapreneurship, business model innovation, organizational rejuvenation and cultural transformation (Ghosh et al, 2021; Pinchot and Soltanifar, 2021).

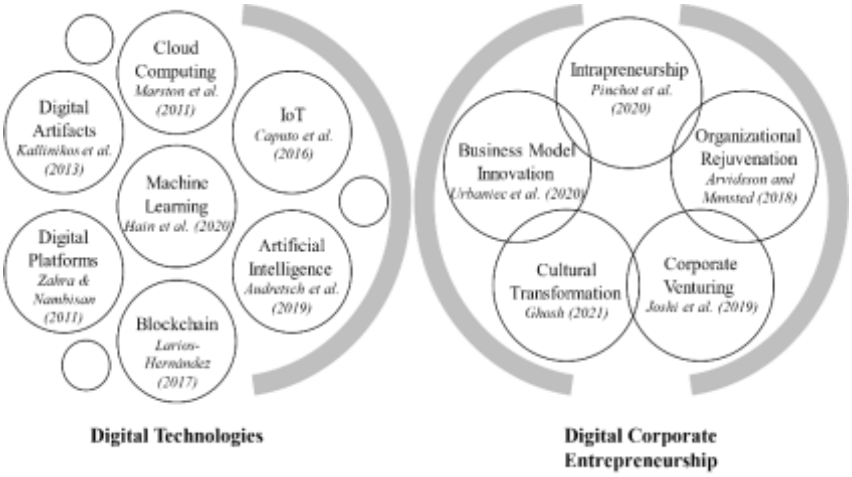

Figure 4: Digital corporate entrepreneurship and emerging digital technologies

4.3 Corporate entrepreneurship theories

CE has been studied from different perspectives and with different theoretical lenses. Traditional and established theories applied in CE are agency theory (Jensen and Meckling, 1976), resource-based view theory (Barney, 1991), dynamic capabilities (Teece et al., 1997), organizational learning theory (Nonaka et al, 1994). Among the established theories of CE, effectuation theory (Sarasvathy, 2001), bricolage theory (Lévi-Strauss, 1962), resource-based view theory (Barney, 1991) and dynamic capabilites (Teece et al, 1997) seem to be the emerging and potential theories in CE field stimulating the most recent debates. Considering the digital perspective, effectuation and bricolage seems to be promising and valuable theories to further develop in digital CE. At the basis of these theories, there is the notion of resources at hand and recombination of resources, Theories related with the nature of CE, commonly described as how established companies are able to exploit new ideas that differ from their existing offerings, while leveraging existing assets and resources (Wolcott and Lippitz, 2007, p.75) and as the entrepreneurial action by which organization members such as managers and employees identify opportunities and recombine resources to pursue them (Arvidsson and Mønsted, 2018, p.370).

We consider Effectuation as one of the most promising theories in CE for at least two reasons: first, while the majority of studies on Effectuation have focused on entrepreneurial activity in the context of startup (Chandler et al., 2011), very limited research has been done in the context of established firms. Second, several studies underline the relevance to study effectuation in the digital context. In a digital entrepreneurial process characterized by high uncertainty, effectuation is a necessary condition and need to be handled (Kraus et al., 2018). Bricolage theory seems to be a promising theory in CE field. While most studies have viewed bricolage as a tool to overcome resource constraints in the context of new ventures, few of them have directly investigated the effects of bricolage to identify new entrepreneurial opportunities in the context of incumbent firms (An et al., 2018). Future research could fully understand the relationship between bricolage, defined as "making do with whatever at hand by reuse and recombination" by the French anthropologist Lèvi-Strauss (1966) and CE. Literature informs an interesting area for future research that lies at the intersection of bricolage and effectuation: exaptation theory (Dew et al, 2004) that refers to a resource characteristic that once served a

particular function but evolved to serve another and the creation of something new starting from existing resources. Exaptation theory seems to be an unexplored theory in CE field. Furthermore, it seems to be tightly related to the characteristics of digital technologies such as affordances and generativity (Nambisan et al, 2019). The nature of digital technologies enables new functionalities in different market contexts, reshaping existing pathways or opening new pathways to create value. Furthermore, exaptation theory seems to be also strongly related to the notion of digital CE, defined as "the entrepreneurial action by which organization members identify opportunities and pursue them by recombining resources in such a way that the development and scaling of new applications creates potent stepping stones for further action" (Arvidsson and Mønsted, 2018, p.371).

5. Avenue for future research

In this section, we suggest and formulate a set of promising future research directions that could advance CE literature. Concerning the "traditional" CE literature, the following avenues for future studies are proposed. First, although CE is in essence a firm-level construct, it manifests itself also in the initiatives of employees (Stevenson and Jarillo, 1990). Yet, surprisingly less attention has been given to the organizational mechanisms enabling firms to better stimulate entrepreneurial behaviors by their employees. Related to this research direction, another two potential avenues for future studies are the ways firms can mitigate *exploration–exploitation* tension at individual level and the connection between employee engagement and CE (Ahmed et al, 2018). Second, although corporates increasingly engage in corporate-startup collaborations to spur innovation (Weiblen and Chesbrough 2015) and start-ups are more frequently perceived as the forerunners of digital transformation, there is still a significant gap in our understanding how corporate—startup collaborations affect CE (Rigtering and Behrens, 2021).

We believe that the most promising and potential future directions of research concern the emerging field of digital CE. Future studies could try to better understand the differences between traditional and digital CE. In intrapreneurship, for istance, digitalization has opened the path for new intrapreneurial opportunities. However, the amount of attention paid to the role of digital intrapreneurs, unlike the "traditional" intrapreneurial figures, within existing organizations is limited and there is little evidence in literature on how digital figures are able to facilitate digital entrepreneurship in incumbent organizations. Finally, related to digitalization, the literature informs that there is a great opportunity for scholars to study experimentation as an approach to CE in established firms. The availability of digital technologies offers new opportunities, favoring "incumbents' experimentation" (Cozzolino et al, 2018). While literature on experimentation in entrepreneurship is abundant, there are few studies investigating experimentation methods in established firms, lacking any precise characterization on established companies' peculiarities (Hampel et al., 2020).

6. Conclusion

This study tried to systematize the extant literature on CE and to guide future research on digital CE. This study provides theoretical and managerial implications. First, the review provided an overview on how CE topic has evolved over time, through a systematization of CE definitions, conceptualizations and theories. This study contributes to the extant literature, focusing on CE theories, as few reviews have done so far, and shading lights on the most promising CE theories applicable and affected by the digital technologies. Second, the review revised the extant knowledge on CE considering the digital perspective, shading lights on how the digital technologies are reshaping CE theories and practices. This review may support and provide guidelines for future research on the emerging and unexplored field of digital CE, shading lights on the first definition on digital CE that could be further developed, on CE forms that can be influenced by the use of digital technologies and on the most promising and valuable theories in digital CE. Finally, this study proposes an agenda for future exploration. Suggestions concerning the future direction of research in the emerging field of digital CE are also proposed in the form of research questions that are valuable for both academics and managers. This study may significantly advance CE literature, considering the digital perspective in CE and may help practitioners in empowering CE activities leveraging on digital technologies. We have outlined a series of promising areas of research for management scholars for interesting in developing research questions to investigate this important development in managerial practice.

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Is Pasta Just About Food? An Interpretation of Customer Needs Through the Case Study of Livi Srl

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Abstract: Having studying myself abroad at Harvard Business School, I want to use the lens of the disruptive innovation to study the case of an Italian family business (Livi srl), operating in the sector of food and beverage (pasta), which has to cope with the crisis pushed by the pandemic. I want to use the concept of the disruptive innovation to understand: How strongly the customers behaviour has been changing in the sector of food and beverage because of Covid 19 in term of functional, emotional and social jobs to be done Whether the disruptive strategy could be a useful business map for the Small Medium Enterprises to re- adapt their profit formula, resources and processes How the local authorities could help the SMEs to leverage the production at a local dimension This paper uses a method based on a case history of an Italian family business, which has been operating for 50 years at a local dimension in the sector of food and beverage. The pandemic has significantly changed the customers' habits and their needs and this put the lights on the big amount of jobs to be done by the companies to meet these incoming customers' requirements. Indeed, in the sector of food and beverage many restaurants were forced to close because of the decision making taken by the local authorities. Would Livi srl be able to cope with this economic downturn? Which strategy should the entrepreneur set up to go through this negative financial performance? I want to answer to these questions by using the lens of theory of the Disruptive Strategy taught by Prof. Clayton at Harvard Business School. This paper puts the lights on the business' ability to adapt its deliberate strategy to the new challenges of the market; indeed, a strong actual strategy is a good mix of a deliberate strategy with an emergent strategy. Finally, the relationship between local authorities (policy) and companies is investigated in a critical way, by which that has studied in term of partnership through the cost benefit analysis rather than considering the policy a social tool able to meet the customers' needs with the business supply.

Keywords: disruptive innovation, emergent strategy, jobs to be done, profit formula, shared value

1. Introduction

Clayton Christensen passed away on January 23rd 2020 after having pioneered the disruptive innovation theory, which has been playing a crucial rule in the business management and innovation theory. He has been the pioneer of this innovation theory for more than half a decade and its lens of study has still represented a benchmark for many business schools and consultant companies. According to the disruptive innovation theory, the process of creating value is not the main concern of large companies, nor those which have the biggest market share, targeting those customers who are willing to pay high premium price for their products and services (Clayton 2015). On the contrary, it involves a low-end process concerning the ability of new entrepreneurs to catch new habits of the customers and their upcoming needs. The principal actor in this scenario is the final citizen who is over-served by the incumbents, because his willingness to pay is pretty low to meet the current market products. By this way, the customer swifts from being a user in the market to a producer or an innovator, able to manufacture a specific good at a personal dimension. Later on, when he would receive positive feedback from the market in terms of demand, he could start to scale production with the help of venture capitalists and other local actors. Where there appears to be a breakthrough with this theory, is in the role of the customer inside the innovation process. According to the current European industrial policies, the growth of domestic product (GDP) is being created by local enterprises and this emphasises the importance of discussing industrial policy to create synergies between them and their wider network (Cappellin 2020). When industrial production meets a geographic strategy, the institutional actors play a crucial role in getting companies to scale their production and supply to meet local dimensions.

This business framework seems to be old and unsuitable for our current market trends, because it assumes that the internal functions of companies such as Research and Development (R&D), Strategy and Merger and Acquisition (M&A) are the main drivers in developing production. However, the American innovation model is based on led-demand and the customer is the main source of innovation by shifting from being a final user to being a producer of those goods or services (McDonald 2015). Assuming that this prospective is accurate, the focus has shifted from industrial policy to a cognitive science analysis where the functional, social and emotional needs of the customer are the key drivers of the productivity. Thus, the role of the company should mainly

concerns the ability to identity these new upcoming needs, and to redefine its profit formula and re-organize its resources and processes.

Having studied abroad at Harvard Business School, I strongly believe that this model of creating value comes from customer and it ends up with the company. I want to study how an Italian family business, specialised in egg pasta's manufacturing, is coping with the conjectural downturn caused by the pandemic and, to do it through the lens of the disruptive innovation theory as taught by Clayton (2018). Finally, I will suggest which course of action (strategy) this company has to address to survive successfully inside this challenging market.

2. Business framework and outcome for the research to come

This paper uses the following business framework:

- 1. Indicating the characteristics of the three innovation models according to the lens of disruptive theory of Prof. Clayton: sustaining innovation, low end disrupter and new market disrupter and, later on, illustrate which model LIVI srl matches with
- 2. The analysis focuses on the customer's needs through the analysis of the jobs to be done
- 3. The company aims at meeting this upcoming needs from the side of the market demand by defining its profit formula, resources and processes
- 4. How the Pandemic had tremendously altered the customer's needs in the sector of food and beverage and what strategy the company has to set up to overcome this conjectural crisis
- 5. Finally, in the conclusion, I explain why the Disruptive theory is the eligible innovation theory to provide a powerful business guideline to the entrepreneurs/companies to cope with the Pandemic in this specific stage of the economics respect by other actual theories in the field of innovation and Entrepreneurship. Secondly, I discuss the necessity for the Next Generation EU to adopt a New Industrial Strategy, based on a circular economy, to prosper the local growth in the sectors led demand and I suggest the Shared Value such as cross- fielded territorial strategy to get the local industrial actors highly connected and cooperative.

3. Livi Srl: A Roman Tradition From 1975

Livi srl has been operating in the local egg pasta market since 1975 when the business family agreement was signed. The main shareholders are Emidio Livi, founder and CEO who owns 55% of equity, Antonella Casella, Emidio's wife, who has 22,5% and his sister (Luigina Livi) who owns the residual share. Family businesses represent 99% of the Italian industrial gross domestic product and the food sector is a key driver of the Italian manufacturing industry. Nowadays, Livi srl operates from a suburbs in Rome; its manufacturing process takes place in a building roughly 1000 meters squared, it counts 80 employees and its revenues were 2,5 million euro in 2019.

Livi srl has built up its core business and success by producing handmade products of high quality, different to those from the multinational manufactures, which have provided retailers with long shelf-life pasta of a medium quality such as Rana and Barilla who provide retailers at the national level with a good product. On the other hand, Livi srl provides egg pasta to local customers such as restaurants and sports clubs and currently has one competitor of similar size. The manufacturing cost per unit (1kg) is 2,7 euro and the customers' pay 15 euro, this means that at this premium price point, roughly 80% of the sales price is gross profit. Their product range was originally limited to 5 kinds of pasta, in the last 10 years they've added starters; such as Supplì and Croquettes, sold at premium price similar to that applied to the pasta. This company counts roughly 30 clients such as award-winning restaurants and sports clubs which are mostly located in the center of Rome.

By using the lens of disruptive innovation theory, I can affirm that the ingredients and the product's quality is the core competence of this business, by which had created his competitive advantage over an amount of time longer than half a century in the sector of food and beverage.

Source: Homemade photo

Figure 1: Tortellini production: One of Livi's key drivers

4. Livi Srl: Low end disruption or new market disruption?

4.1 Sustaining Innovation, low end disruption and new market disruption

As illustrated in the first chapter, Livi srl has been focused on high quality products and a limited number of customers who are mainly top award-winning restaurants and sports clubs in the center of Rome.

Source: Homemade photo

Figure 2: Aroma restaurant: An unusual view

Through the lens of Prof. Clayton's theory of disruptive strategy, given at Harvard Business School, I consider major players such as Barilla and Rana the Sustaining innovators because they "exploit the existing process and cost structure and by making better use of their competitive advantage" (Clayton 2015). Indeed, these companies have scaled production nationally with significant investments in plants and they target customers such as national supermarkets, which are willing to purchase a massive amount of product.

The innovation models proposed by Prof. Clayton are three: sustaining innovation, low end disrupter and new market disrupter. The sustaining innovator increases profit margins by using the existing process and by leveraging its competitive advantage; its targeted customers are at the hedge of the market and they are willing to pay a high price. The low end disrupter is able to offer a product at a low price because it re- modules its operating, financial, distribution processes to make a good margin; its targeted customers are over served. In the case of the new market disruption, the company creates a new demand because it matches a customers' need, which has given up by the market itself (Clayton 2016).

According to that, Livi srl is a new market Disruption because it has created an unknown market by providing high quality homemade products to restaurants and sports clubs, which had previously used their own kitchens. Because Livi srl only uses natural ingredients and has zero chemical additives, they were able to meet requirements of award-winning restaurants. This company was the first small family business to focus on this targeted customer. It is clear that Livi srl had disrupted bigger companies from the bottom of the market because it caught the changing food market during the 80's.

Concerning the disruptive innovation, Chinese and Indonesian brands are considered low end disruptors because they are matching the final customers with a low portfolio by providing a long shelf-life food products

at a lower price (dried egg pasta). Indeed, the innovation rate of their product is low and that is very important even in the sector of food and beverage.

Table 1: Sustaining innovation, low end disruption and new market disruption

	PERFORMANCE TARGETED PERFORMANCE OF THE PRODUCT OR SERVICE	CUSTOMERS TARGETED CUSTOMERS OR MARKET APPLICATION	BUSINESS MODEL IMPACT ON THE REQUIRED BUSINESS MODEL
SUSTAINING INNOVATIONS INCUMBENTS TYPICALLY WIN	Performance improvement in attributes most valued by the industry's most demanding customers. These improvements may be incremental or breakthrough in character.	The most attractive (i.e., profitable) customers in the mainstream markets who are willing to pay for improved performance.	Improves or maintains profit margins by exploiting the existing processes and cost structure and by making better use of current competitive advantages.
LOW-END DISRUPTIONS ENTRANTS TYPICALLY WIN	Performance that is good enough along the traditional metrics of performance at the low-end of the mainstream market.	Over-served customers in the low-end of the mainstream market.	Utilizes a new operating or financial approach or both to earn attractive returns at the discount prices required to win business at the low-end of the market.
NEW-MARKET DISRUPTIONS ENTRANTS TYPICALLY WIN	Lower performance in "traditional" attributes, but improved performance in new attributes—typically simplicity and convenience.	Targets non-consumption: customers who historically lacked the money or skill to buy and use the product.	Business model must make money at lower price per unit sold, and at unit production volumes that initially will be small. Gross margin dollars per unit sold will be significantly lower.

Source: Clayton 2015

On the contrary, it is clear that the innovation rate is pretty high in the LIVI's business model because this company has based its core production on certificate ingredients such as eggs and flour. Therefore, quality product is the competitive advantage of this brand having regarded his competitive market.

As Clayton had emphasized multiple times, disruptive innovation describes *a process* aiming to offer a solution, which does not represent the Pareto dominating the incumbent market (Toubia D., Toubia O. and Ofek E, 2021). This process consists in 5 key steps which summarize the disruptive innovation.

- Step 1: Incumbent ignores the needs of certain market segments. The feature describes the incumbents' behaviour. In the low- end disruption, the opportunity is created by the incumbents which overshoot the needs of certain customers due to their efforts to improve their current products and gain a higher margin on them.
- Step 2: Entrant gain a foothold by targeting an overlooked segment. In Clayton's theory, the focus shifts from the incumbents to the entrants. Because of the lack of attention on certain customer needs by the incumbents, the entrant identifies the geographical and commercial dimension to take a foothold inside the market and this space concerns the customer needs and the availability of a lower portfolio. What is significantly important in this stage regards the capability of the entrant to recognize the overlooked customer segment; thus, the emphasis does not concern the structure of the technology.
- Step 3: Incumbents tend not to respond vigorously. The incumbents ignore the importance of the entrants and this explains why they do not respond temporally to their entrance in the market. On the contrary, the incumbents are dedicating their material and immaterial resources to improve their current product to increase their margin per unit. Meanwhile, the disruptors have time to thrive and prosper. For example, Anthony (2016), noticing that the first prototype of a digital camera was in fact created in 1975 by a Kodak engineer, relates a few possible reasons why Kodak was disrupted by digital photography: misalignment with Kodak 's core business of selling films, investing in the wrong products and missing the merger of digital cameras and smartphone.
- Step 4: Delivering the performance that incumbents' mainstream consumers requires, while preserving the advantage that drove their early stage. That is the stage when the company focuses on the advancement of the technology of their disrupted products to make the incumbent obsolete in the market.

- Step 5: Displace. This is the last step when the technology is able to Pareto- dominate the incumbents' extant offerings, it performs at least as well on all dimensions and better at some and the disruptor is capable to price its product at one which the mainstream market accepts. Meanwhile, the incumbents become obsolete and are largely displaced out of the market.

This framework is a useful guide map to explain how a disrupter beef company called Aleph Farm was capable to scale successfully the production of the steak by adopting the exact same properties of the incumbents beef producers (has the same nutritional value, taste, and molecular structure) with the additional health benefits (no antibiotics, no hormones, lower cholesterol level).

In the case of Aleph Farm, it comes up that: 1) the opportunity emerged from convergence of biomedical innovation in stem cell technology, and the unmet needs ranging from utilitarian (health benefits) to social (environmental and humanitarian concerns); 2) while cultivated meat is not commercially available yet, Aleph Farm decided to enter the market with a product to be served at local restaurants; 3) the space to grow will be gain through the capabilities and the patents which are tough to reach out for the traditional meat producers, 4) the company will scale the production with a competitive price by replacing the traditional meat producers with health benefit offerings without antibiotics; 5) at that point, cultivated meat might become the prevalent choice over the traditional growing cows and producing beef steaks (Toubia D., Toubia O. and Ofek E, 2021).

4.2 The jobs to be done

The business value of Livi srl comes from meeting the customers' needs, which have been shifting from the practicality of long shelf-life food products (dried egg pasta) at discounters to leisure management. This comes from the increasing desire of customers to enjoy their meals in a restaurant with a lovely view. At the base of this concept, there is functional, emotional and social evaluation of the jobs to be done from the customers' prospective (Clayton 2016). Nowadays, many people have dedicated a portion of their budget to enjoying their meal experience rather than staying home, attending restaurants and clubs not only to enjoy a meal but also to post on social media and share their food adventures. In a sense, these customers become a community of food connoisseurs, who are experts of food and dining without being a culinary professional. This means that the customers' needs are not just being met by fulfilling a functional need but also, as illustrated above, the social and emotional value which customers associate with eating high quality homemade products while dining-out.

Source: Homemade photo

Figure 3: Il Convivio Troiani restaurant at Pantheon

According to disruptive innovation theory, a "job" is a problem a person is trying to solve (Clayton 2016). Customers do not really buy products; they "hire" them to get a job done. A jobs to be done perspective focuses on what causes a customer to buy a product rather than relying on the attributes that are merely correlated with buying behaviour (Clayton 2016).

Bear in mind that scheme, it becomes crucial the role of the customer in the marketplace where everything comes from. To perform successfully in the market, the company has to take a set of choices to match this new need coming from the bottom, indeed, by that way the business is creating and maintaining a competitive advantage. Assuming this lens of analysis of the disruptive innovation, the business is a box, which has to organize its resources by processes to match the new customers' needs.

This business analysis puts the lights on re- thinking critically about the importance of the demand in the process of the innovation. Nowadays, most of the macroeconomics and industrial policy aim to study how the

institutional actors could help the industry to improve their production. Thus, it is down to the board of directors to plan a strategy to meet the customers; indeed, the production is based on a deliberate strategy. This model suits mainly most of European companies.

On the contrary, the American model is led demand side and emphasizes the importance of the customers in the innovation. According to this theory (lead users innovation), the company becomes a box where the resources and processes are organized to match the customers' needs (Clayton 2015) having regarded of its profit formula by that meaning who is its final target. That is the reason why this business model adopts an emergent strategy.

The innovative company able to survive and cope with the challenging market is that one able to re- module its deliberate strategy with an emergent strategy. By this way, the entrepreneur and his team would be able to confirm or change the priorities previously determined and ante- pound the opportunities coming from the bottom of the market.

Table 2: Jobs to be done

Source: Clayton 2015

4.3 Organizing innovation

I want to use Prof. Clayton's method to formulate my examination of the company's resources and processes, and illustrate why Livi srl failed to meet the local supermarket's demand back in the 99's.

When Livi srl started to scale up the production by delivering pasta to supermarkets located in Rome, it failed and it was pushed out from the market by multinational brands such as Barilla and Rana. The reason why this happened had to do with its resources and processes, which were set up to supply a different target group. As a result, after three years of retail distribution, Emidio Livi (founder and major shareholder) decided to re-allocate his physical and organizational resources on his core business; ending the new distribution line. This proves how important the profit formula is for a business to be competitive in the market as far as Prof. Clayton had illustrated in the theory of Disruptive strategy. In this case, Livi srl's formula aimed to focus on local clients such as restaurants and sports clubs and therefore, the operating and distribution processes involved small plants. Emphasizing the use of high quality ingredients and eliminating preservative and chemical substances was its key advantage.

Once the profit formula has been set up, then the entrepreneur has to organize his resources (ingredients) and his process (manufacturing steps) to meet that.

According to Harvard Business School academia, a deliberate strategy is about these sets of choices to create a unique position in the market concerning its competitor's segmentation at the eyes of its customers.

Table 3: Profit formula, resources and processes

Source: Clyaton 2015

5. Covid: An opportunity or a threat for Livisrl?

I want to explore how the customers' needs have been changing because of social distancing caused by Covid 19 and which strategy Livi srl should use to cope with this.

The social distancing policies have caused an increase of the consumer packaged goods due to the closure of restaurants, pubs and other local clubs. This significantly jeopardised Livi srl business, and as a result, Emidio Livi had to dismiss 15% of his employees. As this pandemic has impacted his taskforce, financial statement and organizational resources, the question I want to answer is about how Livi srl will address the social distancing by using the tools taught by Prof. Clayton.

The Livi's profit formula changed by shifting from restaurants to end customers who cook and enjoy their meal at home. The big challenge for Emidio is how to reach out to them by exploiting the digitalization of the market, which has increased since Covid 19. Nowadays many family businesses are moving to virtual platforms to meet their customers where they are. "While the transition from physical to digital commerce has long been underway, the pandemic accelerated the shift to online shopping. From May 2020, e-commerce sales in consumer store goods, cleaning products and beauty products had increased by nearly 10 percent according to a Mc Kinsey company" (Mc Kinsey 2021). Will Livi be able to catch this innovating trend, can Emidio reinvent the processes of the company without jeopardising the key advantages of its traditional product?

This challenge requires specific knowledge of technologies, which may be difficult for Emidio and his team because they belong to a generation who are unfamiliar with digital technologies. Partnering with a retail and tech venture capitalist like Peter Jones could bring insights and opportunity when moving into digital markets.

Meanwhile, Livi srl is also addressing a generational transition as Emidio is roughly 73 and his son Mattia is 26; this generational change may play a positive role at this time as Mattia has a better affinity with digital marketing. The market has always been changing and the companies, which are going to be competitive and successful in the market, are able to reinvent themselves during their own time horizon. Therefore, strategy is always temporary (Clayton 2016).

Source: BBC Two - Peter Jones Meets...

Figure 4: Peter Jones has a hard talk with an entrepreneur

To reinvent themselves, Emidio has to formulate a new profit formula, processes and resources. The new formula aims to target the final customers via digital platforms and this could imply a change in the structure of the processes and selling off of most of the physical distribution assets. However, Livi srl still needed to remain focused on manufacturing high quality pasta, which represents its key advantage in respect to its competitors. The quality of the pasta has distinguished this company from its competitors in the consumer market. To reach this goal, Emidio has to transfer his know-how about pasta's production to his son Mattia. By using the lens of the Disruptive innovation theory, I can affirm that the know-how and the manufacturing of egg pasta seems to be "a performance-defining component" (Clayton 2016).

Concerning the social and emotional jobs to be done, it is clear to me how significantly the food market has been changing. Indeed, many people are using virtual platforms such as Zoom to share their recipes and their plates of food, because the kitchen is not just about eating. The kitchen is about passion, performance, a sense of personal satisfaction and community. If Livi caught this trend by getting inside the customers' house, it would be a good business opportunity. The most significant insight I got from the course of Disruptive strategy is the analysis of the jobs to be done and that is the reason why I titled this paper: "Is pasta just about food? An interpretation of customer needs". Livi has to understand that pasta does not just meet a functional need but also a social and emotional one. The popularity of programs like Masterchef and Hell's Kitchen are because common people enjoy, and are interested in developing their cooking skills and being considered part of a community.

Thus, new profit formula changed after Covid and this aims to target final customers at home rather than providing restaurants. Consequently, the company has to re-organize its processes by introducing the digital platform for the delivery. Resources remained the same because the used ingredients and the know-how about product's production represent, as far as I illustrated above, the key performance component of this business.

To innovate his business and avoid to be disrupted, Emidio Livi could not be stuck to his past, while he has to adapt its company to the opportunities coming from the bottom. This advent perfectly suits the concept of an emergent strategy.

Another important insight I got from disruptive innovation is about when a company wants to move into a new path, it is always good to do that by creating a new business unit which is separated from its core business (Clayton, 2015). This means that Livi srl has to maintain its core business to its loyal customers (restaurants and sports clubs) and still catch this market opportunity by creating a separate business unit to avoid to be disrupted. Which it can do by partnering with a tech venture capitalist who is able to navigate the digitalization of the market in the consumer goods arena. By doing this, this traditional Italian family business will survive successfully and will not be disrupted by other competitors.

Finally, I can say that this family company is planning his actual strategy such as good mix of the deliberate strategy and emergent one. This business model allows Emidio to look backward and realized whether his set of choices were right or wrong and, simultaneously, he could manage his agenda to ante- pound the new market challenges. Indeed, like Toubia D., Toubia O. and Ofek E. had recently illustrated in their article in 2021 by analysing the difference between the head vs the lead disruptions, the innovative company able to survive and cope with the challenging market is that one able to re- module its deliberate strategy with an emergent

strategy. By this way, the entrepreneur and his team would be able to confirm or change the priorities previously determined and ante- pound the opportunities or threats coming from the bottom of the market.

6. Conclusion

The disruptive strategy represents a good business guideline to suggest a course of actions a company could take to cope with the Covid. Pandemic had tremendously changed the customer needs and the virus had widened the physical distance between final citizens and companies. This mainly regards the sectors led demand such as healthcare, education, food and beverage and culture and entertainment. Therefore, I wanted to re-visit the theory of the Disruptive Innovation to illustrate how an Italian SME, operating in the sector of food and beverage longer than 50 years, could remain competitive in the market to overcome the pandemic crisis. I go beyond and I can affirm that the pandemic had confirmed the importance and the pertinence of the theory of the Disruptive Strategy in a specific economical phase within the functional, psychological and social needs of the final citizen are tremendously important. Indeed, the reason why this theory represents a powerful and actual guideline for the entrepreneurs to deal with the Pandemic concerns the centrality that the customers' need has within the process of innovation for both of the sides of the market.

In term of the market demand, the Covid had mainly influenced the sectors led demand such as healthcare, education, food and beverage, culture and entertainments such as the Economist index 2021 had illustrated. Those sectors are characterized by a central importance of the customer's needs not only in term of functional aspect but also in term of psychological and social ones differently from the led supply sectors where these intrinsic aspects of the customers' needs are less relevant. On the other hand, in term of supply side, the Disruptive Innovation theory puts the emphasis on the importance of the customer's needs to set up a powerful strategy; indeed, the entrepreneur can set up his profit formula, resources and processes just after having regarded of the actual upcoming functional, psychological and social needs inside the market.

In synthesis, when the business arena changes because of hexagon reasons, the entrepreneur has to individualize clearly his profit formula bearing in mind the functional, psychological and social needs of the customers and then, coherently with this new priority individuated, he has to re- organize his resources and processes to maintain his competitive advantage in a challenging environment. The unique way to address this goal consists in creating a separate business unit from the core business; by that, the company will be able to make a gamble in a new market without jeopardising the core business and his competitive advantage. Therefore, I can affirm that the theory pioneered by Prof. Clayton at Harvard Business School results to be still a valid and pertinent business benchmark to indicate which course of actions a company should adopt to thrive and prosper in a market highly influenced by the pandemic, which had radically changed the customers' behaviour.

Furthermore, the nature led demand of the sectors strongly influenced by the Covid requires the necessity to adopt a New Industrial Strategy where the institutional authorities act at local dimension inside a circular economy to prosper the local industrial growth rather than adopting central monetary and fiscal policies. The EU industrial policy (European Council, 2020a and 2020b) underlines the importance of the circular economy, which aims at leveraging employment in the urban areas (European Commission, 2020). Furthermore, the Pandemic had radically shifted the business focus from "high tech" sectors to "medium- tech" sectors and, that mainly suits the industrial productivity and capacity of the SMEs rather than the multinational manufacturing of the incumbents. According to this contest, it makes more sense to discuss the role of a New Industrial Strategy capable to connect the local actors rather than highlighting the importance of fiscal and monetary policies adopted by central authorities such as the European Central Bank or the Federal Reserve.

The main difference between the pre Covid EU agenda and the EU Next Generation Plan concerns that:

a) the first is led-supply with a focus on the businesses (leveraging the share value of the shareholders) while the second is led- demand with a "core" focus on the customer b) the first regards a monetary and fiscal Policy while the second concerns a Cooperation Regional/Territorial Model c) in the first European Industrial Policy, the Government has a decision power on the market at a macroeconomics level; on the contrary, in the EU Next Generation Plan, it operates at a local dimension to inter- connect the local players represented by customers, trades unions, private equity, local authorities and non-profit organizations. It is important to underline that these players act such as peer negotiating operators according to the New Industrial Policy and therefore, the

Government collaborates with them at a local dimension not only with fiscal and monetary policies. “Therefore, the management of these projects requires the creation of “special purpose vehicle” or “boards”, such as joint ventures, societes mixtes, consortia of companies, PPP, often in collaboration with specialized financial institutions (European Bank of Investments, National investment banks, Word Bank or large national and international banks) and professional technical and legal services and research institutions. Examples are semiautonomous public agencies, such as the French “Poles de competitivité” or the American “authorities” on infrastructure programs” (Cappellin, 2020).

Because of that, I think that the shared value analysis, proposed by Prof. Porter at Harvard Business School to study the policy industry and the healthcare system, could represent a powerful framework to define a cross-field strategy cable to prosper the local growth. According to this theory, the institutional authorities, the businesses, the trade unions, the private equities and the final citizens represent industrial partners rather than isolate players inside the market. We have to think about them such as partners incentivized to collaborate between themselves to leverage the business’ growth at a local dimension rather than considering them such as isolate local actors. Indeed, most of the current discussion about the role of the policy makers in the private market seems to be old and obsolete because it assumes that local authorities act for the interest of their citizens. This theory seems to be good according to a social and philanthropic vision but it lacks of concreteness. By the way, none of these intellectual discussions investigates how to fuel this partnership in a world where cash is king and everybody takes his own decision in term of a monetary evaluation.

Therefore, the industrial focus should start to concentrate on which could be the personal drivers capable to fuel the policy makers on one side and, the businesses, on the other, to collaborate such as partners. Therefore, applying the cost benefit analysis to this scenario means considering the relationship between public stakeholders and companies such as partnership rather than a collaboration. The questions to answer would be: Which are the personal drivers of the police makers and the CEOs, which drive them to reach out to an agreement? Which would their personal returns be? How could the policy makers collaborate with the businesses without jeopardising their value and their market position?

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Towards Sustainable and Agile Business: Orchestrating Business Agility Framework for the Recovery of Small and Medium-Sized Enterprises (SMEs) Affected by Covid-19 in Indonesia

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Abstract: Small and medium-sized enterprises (SMEs) are expected to boost the country's economy. However, the COVID-19 pandemic that happened in 2020 collapsed businesses, especially SMEs in Indonesia. One of the measures to allow small and medium-sized enterprises to respond to the uncertainties of a pandemic is to improve the agility of their companies. Besides agile, SMEs nowadays also concerned with the sustainable elements to tackle social and environmental issues. Business agility is known to be capable of enabling small and medium-sized enterprises to respond effectively to what is happening in the field and to ensure that they do not lose customers. The study was undertaken as a conceptual framework supported by extensive literature review. The assessment of business agility is dependent on the operational agility, customer agility, and partnership agility. The businesses turbulence caused by this pandemic also likely to strengthen the relationship between business agility and SMEs performance. The findings of this study are useful not only to SMEs owners, but also to the government to bridge the agility ability of SMEs industry with customer preferences.

Keywords: agility, Covid-19, Indonesia, SMEs, sustainable

1. Introduction

Historically, small and medium-sized enterprises (SMEs) have been critical participants in national economic development in Indonesia, in particular as a significant work generator and thus a producer of primary and secondary revenue sources for many households. These enterprises were also a significant aspect of the local economy and community engagement (Tambunan, 2008). However, in December 2019, the World Health Organization (WHO) has identified and named a novel coronavirus, and this virus caused a new disease called "COVID-19". This new disease continues to propagate exponentially around the world in a short time (Lu, Stratton, and Tang, 2020). In Indonesia, only, as of 5 May 2021, there are 1,686,373 confirmed cases of COVID-19 with 46,137 deaths (World Health Organization, 2021), and this number will likely increase day by day. This latest coronavirus epidemic spread quickly through all continents from January 2020, and the spread is not only detrimental to our wellbeing but also our economic development, including small businesses (Yue et al., 2020). Very little scientific research on how the pandemic affects businesses across countries. The first results from the surveys undertaken by the OECD (Organization for Economic Co-operation and Development) show that businesses are easily profoundly depressed and sincerely concerned. The surveys found that over 50% still expect massive decreases in sales with sufficient funds to sustain the crisis only for a few months (Organization for Economic Co-operation and Development, 2020).

The COVID-19 epidemic seriously affects Indonesian enterprises and employment. Recent studies carried out by the ILO indicate that most small and medium-sized enterprises (SMEs) have been compelled, either temporarily or indefinitely, to close businesses by consequence of COVID-19 in Indonesia. The COVID-19 pandemic also causes a burden on the continuity of business, as companies face supply and raw material shortages and finished goods shipment difficulties. A quarter of companies cannot recruit adequate staff for their activities owing in part to travel constraints (International Labor Organization, 2020). According to the Indonesian Center of Statistic/Badan Pusat Statistik (BPS), after the 1998 Asian financial crisis, the Indonesian economy endured its rapid slowdown in the second quarter of 2020, when the COVID-19 pandemic shutdown broad regions of the

world, ravaged industries and make millions of workers unemployed. The second quarter of 2020 showed minus 5.32% of economic growth, the lowest since the first quarter of 1999 (Badan Pusat Statistik, 2020).

The end of this pandemic is unclear and triggers a widespread lack of public trust in mitigating the risks of it. The macroeconomic effect of COVID-19 is also expected to worsen in all societies (Barua, 2020). Policymakers and economists believe that governments will adopt like the world has never seen, a mix of oriented, far-reaching, and different kinds of monetary and fiscal policy intervention. A wide variety of tailored fiscal and monetary initiatives for industry, families, wellness, public interest, finance, and banking at a national and foreign level will be introduced (Baldwin and di Mauro, 2020). Government and epidemiologists play a key role in concentrating on primary prevention goals, such as reducing morbidity, avoiding outbreaks that override health systems, and particularly maintaining the economic impacts within a tolerable range. Public policy strategies that inform public sentiment about how best to avoid contamination are critical to economic crisis management (Anderson, *et.al*, 2020).

Continual shifts in the consumer climate, along with ever-increasing customer expectations, have compelled companies to be adaptable. Businesses must be based on core competencies that will enable them to thrive in today's volatile and competitive climate (Zaini *et al.*, 2020). Organizational agility became a crucial skill for organizations to succeed and adapt to drastic developments in the business world. Organizational agility enables organizations to identify and capitalize on prospects as well as counter risks faster than competitors (Govuzela and Mafini, 2019; Liu and Yang, 2020; Shin *et al.*, 2015). This organizational agility is forecasted to become one of problem-solver for SMEs to overcome their crisis during COVID-19. The aim of this study therefore is to generate the conceptual framework that shows the relationship of SMEs' agility with their performance and sustainability with Covid-19 as their market turbulence driver.

2. Literature review

2.1 Indonesian SMEs

Indonesia has a population of more than 200 million people. It is a wide archipelago of over 13,000 (600 inhabitants) in south eastern Asia. About 85% of the people are Muslim, but there are also significant communities of Hindu, Christian, and Buddhist. In particular Chinese citizens are very commercially involved, and while they constitute only around 3 % of the population, they may influence 75% or more of the wealth of the country (Chavez, 1997). For various reasons, developing countries such as Indonesia values small and medium-sized enterprises (SMEs) due to their potential to develop into larger enterprises, more productive units, capacity to develop and introduce emerging technology; and ability to respond to changing economic conditions (Berry, Rodriguez, and Sandee, 2001). In Indonesian SMEs, there are some features that make such businesses highly significant in Indonesia. First, they represent over 90 percent of all firms, and thus represent the largest source of employment and provide a livelihood for more than 90 percent of the nation"s population of labor, and are mainly indigenous/local owners. Second, they are broadly dispersed across the rural areas and are primarily farm-based, so as a motor of rural economic growth, they are significant. Third, women and youth who are less educated are primarily labor-intensive. Fourth, most companies (particularly small enterprises) are generally financing their businesses through personal savings. Fifth, it is less reliant on imports and produces, for low-income consumers, primarily basic consumer products for domestic markets. The fact that employees and entrepreneurs are also low-qualified and that many people build themselves in Indonesia (especially in small enterprises) were driven by poverty and not by entrepreneurship is another important factor in SMEs that can make it more distinct from those in developed countries (Tambunan, 2008).

In Indonesia, SMEs have a key role to play in economic growth and social inclusion. Indonesian SMEs account for approximately 97 percent of domestic jobs and 56 percent of the company's overall spending, based on statistics from the Ministry of Co-operatives and SMEs. Indonesia has the MSME Act and a separate Ministry for Cooperatives and SMEs. SMEs could streamline the wealth of public programs and encourage innovative companies that can generate productive employment and take place in global businesses (OECD, 2018). It is proven that Indonesian small and medium-sized businesses contribute greater to the Gross Domestic Products (GDP) compared to the larger enterprises. For example, in 2003, Indonesian GDP growth was 4,78%, which 2,66% sourced from SMEs, and 2,12% come from larger enterprises (Tambunan and Xiangfeng, 2006). Therefore, the survivability of SMEs in Indonesia has a major part in the country's economic development.

2.2 COVID-19 and SMEs

As a result of Covid-19, businesses face many difficulties and uncertainties. For potential planning steps, however, organization actors would need to establish several scenarios. Scenarios are used as instruments that activate and enhance corporate learning cycles. In the present situation, businesses examine their objective in social structure and implement a stakeholder approach that helps those affected and their families (Papadopoulos, Baltas, and Balta, 2020). Recent research showed that only 39% of businesses in the United Kingdom had funded their cash flow before COVID-19, which implies that 61% of enterprises will run out of cash, 8.6% of which have no revenue from micro-enterprises at particular danger. It is important to boost stability as the Black Swan incident (like this pandemic) happens to SMEs' precautionary savings (Cowling, Brown, and Rocha, 2020; Juergensen, Guimón, and Narula, 2020).

The most important element for small business owners to maintain their enterprise is their resilience because resilience is the essential concept in managing crises on entrepreneurship (Doern, Williams, and Vorley, 2019). In order to mitigate damaging effects from a crisis, crisis management is used, and if performed properly, the activities of organizations with damagefd or deficient processes will rapidly be restored to their operational process (Williams et al., 2017). A very few crisis management discusses in business research assess the action of business people or organizations primarily to counteract the possible adverse impacts of a crisis (Doern et al., 2019).

Before this COVID-19 pandemic occurred, Indonesia had already faced the Asian financial crisis that makes its economy crippled in 1998. At that time, SMEs must adapt to fast, unforeseen, and shifting in their external surroundings. One of the proven solutions for SMEs to survive during the 1998 crisis was to make a strategic alliance with other SMEs even it had risks to reduce their competitive advantages (Marino et al., 2008). Indonesia itself with other countries are releasing policies that will support the small businesses' sustainability, however since the pandemic is still ongoing, the policies can change depends on the country's situation (Dhewanto, Nazmuzzaman, and Fauzan, 2020). Nevertheless, as few such disasters have happened before, including COVID-19, there have been few scholarly reports about such a disaster and the recovery plan, especially for small and medium-sized businesses.

2.3 COVID-19 turbulence

Ahmed and Nair (2020) in their reports stated that many firms were rapidly challenged by the first evident repercussions of the COVID-19 outbreak in their operational and commercial strategies. Everything was questioned as well, from what and how workers worked to what items were the most attractive and could easily be customized to consumers. Therefore, to cope with any turbulence, many firms are now turned to practices commonly associated with agile practices in the hope of adapting more quickly to changing business priorities. Agile organizations are designed to be fast, resilient, and adaptable (Loss and Crave, 2011). According to Handscomb *et.al* (2020), organizations using agile practices should be perfectly suited to respond to shocks such as the COVID-19 pandemic. They added that the companies during the crisis provides insights around which elements of their operating models proved most useful in practice. Through their research, the marketing and environment characteristics stood out as key important indicators in their business models during the turbulence: companies that ranked higher on managing the impact of the COVID-19 crisis were also those with agile practices more deeply embedded in their enterprise operating models.

2.4 Organizational agility

Agility is the ability to detect opportunities for innovation and seize those competitive market opportunities by assembling requisite assets, knowledge, and relationships with speed and surprise (Sambamurthy, Bharadwaj and Grover, 2003; Qosasi *et al.*, 2019). Organizational agility is generally a beneficial organizational feature that enables an organization to do the best amid uncertainties and compete in turbulent circumstances (Raj and Vinodh, 2014). Past research has often combined agility as an ability to respond, to compete in versatile and rapid way, to proactively innovate, and to profit by increasing quality. It also combines the ability of discover new competitive advantage, to exploit existing knowledge, assets and relations, and to adapt it to sudden change in business environment (Sambamurthy, *et.al*, 2003; Osei *et al.*, 2019).

In the past research, organizational agility has been emphasized in three key areas: organizational agility (OA), customer agility (CA), and partnership agility (PA) (Goswami and Kumar, 2018; Koçyiğit and Akkaya, 2020; Zaini, Masrek and Sani, 2020). They are summarised as follows:

- OA: The capacity to process information that substantially contributes to the sensing and response by gathering associated operational data in order to discover the potential and usage of business processes to transform priorities into action.
- CA: The capacity of an organization to handle consumer preferences and requirements changes. The CA idea has been linked to the organization's capacity to gather and react to customer-related market information.
- PA: the capacity to utilize the insights, skills and assets of business partners to identify and implement new business opportunities through inter-company cooperation that fostering partners to connect the most complete and timely information in the value chain for increased process effectiveness and efficiency.

Past researchers also suggest that in a dynamic environment, dynamic capability is more significant since it helps firms to change in a positive way and dynamic capability values are rapidly increase in unstable circumstances. (Zhou, Mavondo and Saunders, 2019). The ability to handle turbulence and gain a competitive edge is also called as agility. But there are contradicting instances too in the literature. Some sources argued that it is difficult to foresee future growth in extremely unstable situations, so companies depend on external knowledge, and dynamic capability is experiential and less dependent on performance. (Heilmann, Forsten-Astikainen and Kultalahti, 2020). Since Covid-19 pandemic spread rapidly and disrupt the market especially SMEs, therefore Covid-19 could act as a turbulent environment.

2.5 Small and medium-sized enterprises' sustainability

In the area of economic growth, employment, and distribution of development, small and medium-sized firms (SMEs) play an essential part. They produce jobs and contribute to the growth of the gross domestic product (GDP). Regarding the moderating effect of entrepreneurial orientation (EO), entrepreneurial innovation has a positive and significant influence on entrepreneurial capacity–SMEs' sustainable growth (EA)–SMESG relationships; proactivity has a positive effect on relations between almost all EA dimensions and SMESGs and risk trends are responsible for the creativity and ability of EA–SMESG relationships. (Prasanna *et al.*, 2019; Hernita *et al.*, 2021).

Industrial, trade and transportation sectors are the SMEs which are most contributing to economic growth in Indonesia. The literature often states that the comparative benefit of micro-small to medumber (MSMEs) compared to their biggest (LEs), when it comes to the changing market demand, is the flexibility and ability of micro-small and medumber companies to move from one product to another and to expand easily if economic crises are an actual fact. SMEs also have the power to alleviate economic gaps and social inequities in the social field. Redistribution of income may lead to significant changes in the structure of human resources, mainly influencing economic production through the influence on life happiness and job motivation. (Prasanna *et al.*, 2019; Gamage *et al.*, 2020).

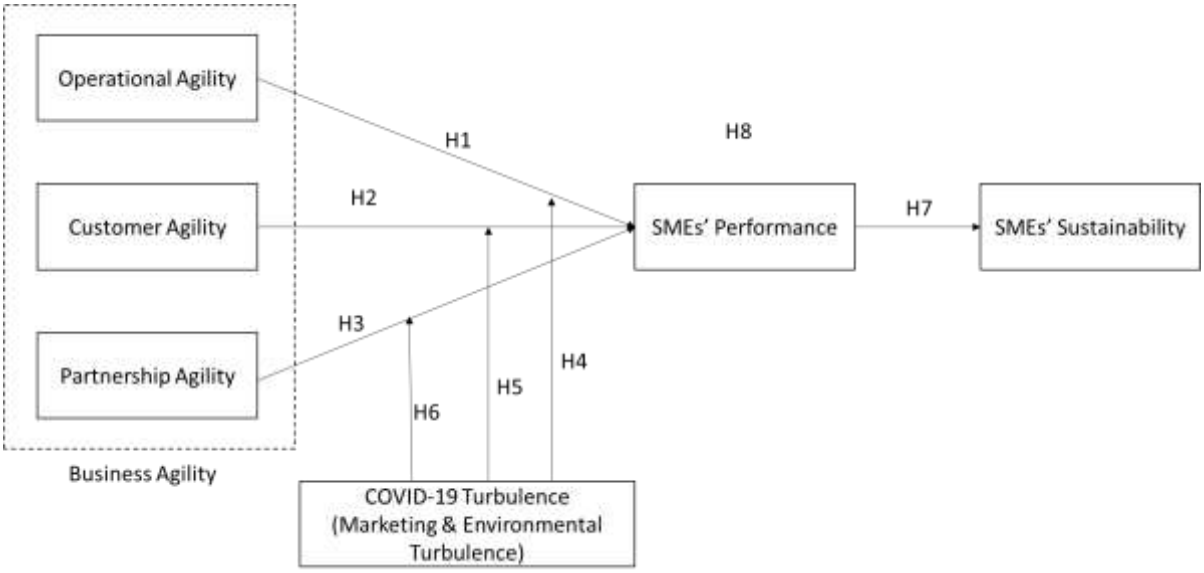
The role of SMEs hence is to enable customers with low buying power to buy goods and services and to provide such to urban consumers with more buying power. SMEs also help by delivering raw materials or services to bigger companies and municipal authorities. Increased production and productivity may lead to increased earnings for SMEs and the abolition of poverty by millions of individuals (Gamage *et al.*, 2020; Lin *et al.*, 2020).

Small and medium-sized enterprises are highly significant and strategically significant for building the national economy's structure. Economic globalisation, as a result of increasingly strong competition, has presented SMEs with several hurdles. SMEs are designed to establish independence, play a very competitive role in the production and distribution of basic resources, raw materials and capital necessary to thrive with free competition. (Oliveira, Tan, and Guedes, 2018; Hernita *et al.*, 2021). SMEs in a country's socio-economic situation deserve the highest emphasis among policymakers. SMEs which allow optimal development have strategic features such as (1) innovation and the use of technologies as a basis for product innovation, (2) the development of mutually beneficial humanitarian relations, (3) the ability to create and absorb jobs, and (4) flexibility and adaptability to the market conditions. For the socio-economic situation, SMEs are classified into three categories: (1) livelihood activities—SMEs whose goal is to make a living, also known as the informal sector;

(2) micro-enterprises—SMEs with the personality of craftspeople but not yet entrepreneurial; and (3) small dynamic enterprises—SMEs with an entrepreneurial spirit and the willingness to recognise subcontracts and export job opportunities. (Vinodh, 2010; Singh and Vinodh, 2017; Oliveira, Tan and Guedes, 2018; Hernita *et al.*, 2021).

3. Conceptual framework

As we mentioned on the introduction above, the business agility elements are highly related with SMEs performance.



3.1 Business agility as the source of business' performance

The idea of Organizational Agility as the heart of business agility is grounded in two notions that have previously been explored (organizational flexibility, as a proactive facet and organizational adaptability, as a reactive facet). In particular, OA includes the capacity for firms to detect and adapt swiftly to environmental changes by reconfiguring their assets, business strategies and business processes (Wendler, 2014; Dabić *et al.*, 2021). In addition, Sambamurthy et al. (2003) state that there are three interrelated elements of OA: (i) customer agility, including the use of views from the customer to capture enhanced business insights; (ii) the partnership's agility, which includes know-how absorption from different business partners in order to enhance the company's response to market demands. ; and, (iii) operational agility, including rapid process redesign to take advantage of changeable market and environmental situations.

Operational agility displays the capacity of company operations in the exploitation of innovation possibilities and competitive action to achieve speed, precision, and cost economy. Operational agility enables that companies can quickly restructure existing processes and develop new processes to use changing market conditions. Information technology drives the customization, disintegration and recombination of business processes in order to generate new business processes (Felipe, Roldán, and Leal-Rodríguez, 2017; Zhou, Mavondo and Saunders, 2019). Therefore we propose hypothesis:

H1= Operational Agility is positively related with SMEs performance

Customer agility is the collaboration of customers to explore and take advantage of innovative possibilities and competitive maneuvers. Sambamurthy et al. (2003) argued, that customers play three major roles in enhancing competition actions of companies: as a source of ideas for innovation, as a creative partner in developing and designing new products and services and as a user to evaluate or enhance the knowledge of a new product or service for other users. Thus we propose:

H2= Customer agility is positively related with SMEs performance

The agility in partnership is the capacity for suppliers, distributors, contractors and logistics providers to leverage assets, knowledge and skills through alliances, partnerships and joint enterprises. Partnership agility allows enterprises to create a system of strategic, extended or virtual collaborations to explore innovation

opportunities and competitive indicators. Partnership agility also refers to companies' ability to exploit opportunities by efficient handling and storage of assets and resources, logistics or customer support. (Sambamurthy *et al,* 2003). Therefore we propose the following hypoyhesis:

H3= Partnership Agility is positively related with SMEs performance

3.2 COVID-19 as market turbulence

Following on from prior inclusive approaches, such as the one by Zhou *et.al* (2019), this research concepts business agility as the conscious response of the firm, with the purpose of making conduct more efficient in extremely turbulent and complex situations. This comprises not just a quick response to change but the company's capacity to foresee and take advantage of possibilities via innovation and creativity.. Accordingly:

H4= COVID-19 turbulence moderates the relationship between OA and SMEs Performance. This relationship is stronger under high turbulence than under low turbulence

Agility involves exploring and exploiting market evaluation possibilities. Exploration is an organizational experiment with new options and the search of knowledge about undiscovered competitive potential. The usage and development of things which have already been understood is called as exploitation and enhanced by existing skills, technology and knowledge. Furthermore the agility includes capabilities of the company connected to customer interactions, the organization of internal processes and the use of its external business partner ecosystem (Samamburthy *et.al*, 2003; Zhou *et.al*, 2019). Therefore:

H5= COVID-19 turbulence moderates the relationship between CA and SMEs Performance. This relationship is stronger under high turbulence than under low turbulence

Zhou *et.al* (2019) discovered that companies with broad information networks were able to demonstrate higher reactivity and performance in volatile business situations. Information technology allows for more interconnected cooperation by means of platforms like websites, operational management (logistics or supply chain) and transparency in technology. Thus:

H6= COVID-19 turbulence moderates the relationship between PA and SMEs Performance. This relationship is stronger under high turbulence than under low turbulence

3.3 The role of business agility to make SMEs sustainable

Business agility helps firms to detect better opportunities for competing action on prospectives, regulate and adjust business processes, improve product adaptability and minimize response time in a changed business environment. (Singh and Vinodh, 2017). Business agility also concerns a firm's ability to quickly identify and adapt to competitive markets, enabling the company to expand more successfully in a competitive environment with increased profitability and environmental and social advantages. (Lin *et al.*, 2020; Hernita *et al.*, 2021).

One goal of adopting sustainable aspects for small and medium-sized enterprises is to stimulate the increase of SME productivity to create jobs, reduce unemployment, reduce poverty, and create social stability. Economic sustainability means balance between the economic, social and environmental components in order to increase production and optimize the use of human resources (Prasanna *et al.*, 2019; Hernita *et al.*, 2021). Consequently, the following hypotheses are proposed:

H7: SMEs' Performance is positively related with SMEs' Sustainability

H8: SMEs' Performance mediates the relationship between Business Agility and SMEs' Sustainability

4. Future research

The conceptual framework explaining the proposed relationship between business agility elements, SME performance moderated by COVID-19 as a market turbulence driver, and sustainability elements later will be continued as further study to be tested using survey questionnaire data collection and quantitative study methodology, particularly Structural Equation Modelling (SEM). The result hopefully will shed a light theoretically to SMEs' performance during uncertain condition like COVID-19 pandemic and how to recover the SMEs' performance

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Women Entrepreneurs in FNB Sector Faces Covid-19 Pandemic

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Abstract: Covid-19 pandemic has catches global attention and caused huge impact in all sectors. Micro and Small Medium Enterprises (MSME) viewed as one of the economic entities that struggle during economic crisis, yet vulnerable if failed to adapt the situation. According to data from the Ministry of Cooperatives and Small and Medium Enterprises (2020), up to ninety-eight percent of business actors are micro and ultra-micro, with daily income and many of them were unable to run a business during the pandemic. In fact, about sixty percent of the number of MSME are managed by women whose dominant sector is fashion, craft and Food and Beverages (FNB) (The Ministry of Women's Empowerment and Child Protection, 2021). However, the FNB sector are actually growing and developing amid this pandemic (Deloitte, 2020). Technological change is one of the key strategies to win competition and increase company performance (Akman and Dagdeviren, 2018). Therefore, by using a literature study with a theoretical approach, this study aims to find out what technological innovations are used by women entrepreneurs on the MSMEs scale in the FNB field, so that they can improve business performance and adapt toward disruption caused by the Covid-19 pandemic. The results of this study obtained a mapping model of the use of types of technological innovations ranging from production processes, storage, packaging, marketing, delivery processes, financial stages and human development processes that can help women entrepreneurs to be sustainable during the pandemic.

Keywords: women entrepreneurs, Covid-19 pandemic, technology, FNB, MSMEs, entrepreneurship sustainability

1. Introduction

The development of MSME in Indonesia in the 2014-2018 period, as many as ninety-nine percent of the sixty-four million business units in Indonesia are MSMEs and about sixty percent of the number of MSMEs are managed by women with the sectors controlled are fashion, craft and FNB (Ministry of Women's Empowerment and Children Protection, 2021). The Ministry of Industry noted that the growth of the FNB industry in 2019 reached 7.78% and contributed up to 36.40% to the GDP of the non-oil and gas processing industry (Ministry of Industry of Indonesia, 2020). Unfortunately, the emergence of the Covid-19 virus outbreak has resulted in a food crisis and instability in global food security (Hailu, G, 2021). In fact, the FNB industry are a sector that is currently in the high demand category, despite the pressure from the impact of the Covid-19 pandemic.

In order to sustain of this condition, the use of technology has brought women enterprises into better business performance and able to offer business opportunities to growth (Komunte, M, 2015). To date, research on the use of technological innovation is still limited to one or a few parts of enterprise activities. Therefore, research on the types of use of technological innovations carried out by women owned MSMEs in FNB in the face of the covid-19 pandemic is important to do. So that, by studying previous studies and implement literature study using theoretical approach, this research aims to recognize the diverse of strategies to innovation technology in FNB MSMEs owned by women. So that they be able to sustain and adapt toward disruption caused by Covid-19 pandemic by unfolding the following research question: What are the type of innovation technology that used by women-owned MSMEs to survive and increase business performance in Covid-19 pandemic era?

2. Literature review

2.1 Women-Owned MSMEs on FNB sector

Women have important role in economic development through MSMEs. Women's role in MSMEs both as business actors/ owners (entrepreneurs) and as workers. According to Shastri, S et al (2019) the phenomenon

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of women working for a living occurs because of the encouragement of needs, willingness and abilities as well as job opportunities available and women's access to these opportunities. The economic status of women is seen from the activity of earning a living, access to factors of production, level income generated and its contribution to family income. The role of women in MSMEs is one of the keys to increase economy betterment.

Despite the importance of MSMEs especially owned by women, the recent situation of pandemic Covid-19 has brought another sad story, as of early August 2021 COVID-19 in Indonesia has reached three point six million cases (worldometer, 2021). Covid-19 pandemic has catch global attention and caused huge impact in all sectors. Furthermore, this pandemic has brought the world into the worst case of economic crisis. This economic crisis happened mostly because lockdown policy. Huge number of people stay at home and only have limited access to any kind of resources, including food preference. The adoption of social distancing by societies in the year 2020 has brought new cultures and daily habits. There are some habits that improve, minimize and even stop. For example, people started to pay more attention in their interaction by using masker and make a distance during the conversation, they also tend to increase stock up for daily needs and often change their preferences in food. It is very natural that people may insecure, panic, and react overwhelmingly into the situation, but unfortunately the situation brings significant impact for economies and business, especially MSMEs. Some MSMEs may get the benefits, and some the opposites.

2.2 Utilization of technology on FNB in Covid-19 pandemic

The use of technology may become one of the solutions to MSMEs to face pandemic condition. Technology adoption enables MSMEs to innovate and sustain business (Salam, S et al, 2019), Technology in this research define as broad technology especially that use in FNB industry. Information technology are very important to women business owners, as they can open access to information and communication that allows them to connect with other business owners and market. For women in rural or remote areas, technology can limit isolation and increasing sharing activity. For women in particular, this means much needed flexible working hours and opportunities to balance home and business needs. Other technology also gives significant effect for example food processing, help the industry to increase product value (Alsen et al, 2018).

By utilizing digital technology, MSMEs can compete with large-scale entrepreneurs and have the same opportunity to sell their products by being on the same platform in promotional activities and transaction activities such as through e-commerce, social media or others. In addition, the use of digital technology makes women entrepreneurs in MSMEs in the FNB sector no need to conduct market surveys to study competing products. They are simply searching for a market survey. Technologies that can be applied include technology 4.0 such as the use of social media and e-commerce because it can present detailed customer request data, following health protocols in the form of social distancing with physical distance between customers and sellers, facilitating the sales system and increasing turnover (Kumar, A and Ayedee, N, 2021).

3. Methodology

This research seeks to form a theoretical framework as the initial stage of conducting further research on Women Entrepreneurs in the FNB Sector in Facing the Covid-19 pandemic. This research using qualitative approach with literature study to gain an understanding of mapping technology innovation used by women MSME entrepreneurs in the FNB industry. The process of collecting data obtained from previous research and journals about MSME in FNB sectors, women entrepreneur technology adoption and utilization, then making notes of important information and analyzing the data. This research is a preliminary study that is descriptive in nature, in terms of mapping innovation technology which is commonly used by MSME in the field of FNB. This theoretical research focuses on the concept or theory that explains or describes the phenomenon being studied by synthesizing the literature that produce a new model using integrative literature review (Torraco, R.J. 2005).

4. Result and discussion

The COVID-19 pandemic has become a difficult time for business actors in various sectors, including women entrepreneurs in the FNB industry. In facing a pandemic Covid-19 MSMEs experiencing various challenges including the termination of employment, the financial crisis, security and employee health insurance, the decline in sales and customer demand (Kumar, A and Ayedee, N, 2021). To address these challenges, MSMEs need to carry out an innovation process that requires solutions in the fields of technology, marketing and research and development (Dossou-Yovo, A and Keen, C. 2021). Since the industrial revolution 4.0 added to the Covid-19 crisis, the transformation of conventional routine work has shifted to jobs that use technology in the

form of automation in production, distribution, transportation, marketing and all other aspects of business activities that have greatly increased productivity and increased living standards (Blit, 2020). In this study, researchers tried to synthesize previous literature regarding the utilization of technological innovations in the field of FNB for women entrepreneurs in order to sustain and develop the enterprises. The results obtained are in the form of mapping model of technology utilization for women entrepreneurs in MSMEs in the FNB industry as follows:

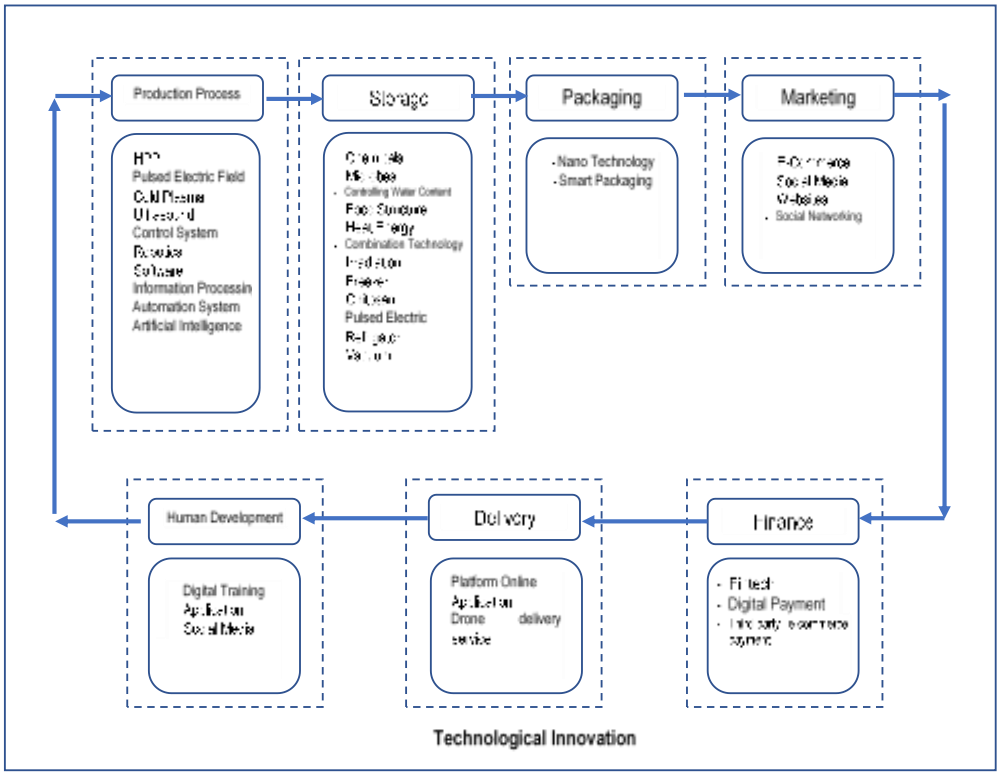

Figure 1: Mapping of technological innovation usage for women entrepreneur in MSME FNB sectors

4.1 Production process

In production activities, many MSMEs are still using conventional systems, but since the pandemic period, it has required people to stay at home so that FNB entrepreneurs use an automation system to minimize the exposure of workers and stakeholders including customers in the FNB industry from the covid-19 virus directly and achieve hygienic requirements and food safety (Blit, 2020). Meanwhile, according to Schug, D. (2018), FNB production process technology can be carried out in several ways such as "High pressure processing, pulsed electric fields, cold plasma, ultrasound, control systems, and robotics". Many FNB manufacturers invest in the production process by utilizing technology such as using automation systems that use software, information processing equipment, robotics and artificial intelligence technology (Kopytov, A et al, 2018). With the advent of interactive robots, human-to-human interaction operations can be replaced by interactions between humans and robots. For example, when a worker is sick or a worker works from home, production activities can continue and reduce the risk of being exposed to Covid 19 by utilizing digital information and communication technology as well as information processing technology (Blit, 2020).

4.2 Storage

Storage of FNB made to prevent the decay that has a longer shelf life with a quality that is still awake. Storage methods carried out starting from fresh food ingredients (raw materials), processing, ready-made food, packaging to distribution of the product. Several food storage technologies include the use of chemicals, microbes, controlling water content, food structure and the use of heat and energy as well as combination technology. With the pandemic, many MSMEs in the FNB that innovate products and shifts prepared products into frozen food or processed or semi-finished products.

Therefore, storage technology is becoming increasingly diverse. For example, fish and meat are usually stored in the freezer and for semi-finished preparations, they are vacuumed first to maintain sterility. In contrast to the basic ingredients of vegetable pieces that use irradiation technology. In addition, for fruits, a chitosan coating technique is used to delay ripening. For flour-based products such as bread, the storage and preservation technology used is a combination of ethanol and emitters to absorb oxygen. In addition, the use of gamma irradiation and pulsed electric methods can also be used to reduce microbes so that the product is more durable (Sari, D. A., and Hadiyanto, H, 2013).

4.3 Packaging

Packaging is one of the important aspects in providing added value to packaged products. Packaging technology continues to develop all the time. The function of packaging has also begun to shift from being initially just a place to store food, then switching functions to prevent quality degradation, extend shelf life, maintain product quality and safety. During pandemic conditions, packaging plays a very important role in protecting food from the effects of exposure to the external environment such as viruses, especially the covid 19 virus, bacteria and so on that may cause product damage. Today's packaging also functions as a medium for placing product information such as brands and nutritional content, so that packaging has an important role in conveying messages and becomes a visual attraction for consumers (Humairani R et al, 2021). The ideal food packaging needs to meet several criteria including being strong so as to facilitate handling during transportation, cheap so that the product is more competitive, and safe for consumers. With current conditions, the increasing market demand for new, up-to-date, ready to eat, and stable products has led to continuous innovation in food product packaging to meet this demand (Garcia, M. S., and Lagaron, J. M, 2012). The packaging technology that is able to answer these challenges is smart packaging which can be categorized into two, namely active packaging and intelligent packaging (Joshi, A, 2016). Active and intelligent packaging are designed with different functions. Active packaging was developed to extend the shelf life of the product and is also designed to improve product quality and safety, such as the modified atmosphere packaging method. Meanwhile, Intelligent packaging allows packaging to communicate with consumers by displaying special signs on the packaging to mark the condition of the product in the package, such as a fresh meter (Joshi, A, 2016).

In addition, environmentally friendly packaging materials are also an important concern. The use of packaging made from sago or red cabbage (Hamzah, N. H. C. et al, 2021) is also currently an option, and many FNB entrepreneurs are also starting to switch from using 4tyrofoam in packaging to using paper and other environmentally friendly materials. Another material used in food packaging is the use of nanotechnology in the form of nanocomposites. The advantages of nanocomposite materials are that they can improve the quality of packaging inhibition against gas so that they can maintain the freshness of food or beverage products, increase packaging strength, and have better heat resistance properties than other materials such as polymers and conventional composites, and increase packaging biodegradation (Bratovčić A et al, 2015). The use of nanocomposites in active packaging has also been widely used because of its abundance, cheapness, and easy processing.

4.4 Marketing

Most FNB MSMEs managed by women entrepreneurs still carry out many activities on their own, including in terms of marketing. Before the pandemic, women entrepreneurs did a lot of marketing such as collaboration with expertise, exhibitions abroad, participating in community activities (Azzahra, S. and Dhewanto, W, 2016). However, with the COVID-19 pandemic, most of these marketing activities had to stop. To work around this, they can take advantage of digital marketing technology. Types of digital marketing that can be done include using social media or social networking sites such as Instagram, WhatsApp, YouTube, Facebook (Wibowo et al, 2021). During a pandemic, the number of social media users is increasing so that MSMEs need to show the existence of their company and products on social media (Celimli, S., and Adanacioglu, H, 2021). Social media that is quite influential, especially for the market segmentation of the younger generation or "ok boomers" in terms of marketing is Tiktok (Lim, Y.J., PhD. 2020; Wibowo et al, 2021), facebook, instagram and twitter (Celimli, S., and Adanacioglu, H, 2021). In addition, they also need to do branding by utilizing social media and joining the market place. In utilizing social media, many MSMEs use the endorsement method to social media influencers so that marketing can be more effective (Balaban, D.C and Racz, R.G, 2020). In addition to social media, the use of websites is also quite effective for MSMEs in marketing and distributing product knowledge information to consumers (Kriechbaumer, F and Christodoulidou, N, 2014). Conventional marketing activities innovate into digital-based online marketing to reach more markets and consumers who stay at home during this pandemic.

4.5 Finance

The COVID-19 pandemic has made all conventional things need to be transformed into digital, including for the MSME scale in the FNB sector to continue running. The technology used does not need a high level of software, simply adapted to the needs and simple as possible for ease of use. Digitization can be done in the form of using financial technology (fintech) which has been proven to be successful in overcoming several problems faced by MSMEs and can stimulate the growth of MSMEs (Suryanto et al, 2020).

Some of the activities that can be carried out are peer to peer (P2P) lending services in the form of capital loans from online platforms, e-wallet, personal finance, financial recording applications, crowdfunding microfinancing fundraising, market comparison, digital payment systems or digital finance (Suryanto et al, 2020). Activities that are usually carried out manually can be replaced with financial recording applications. Currently there are many applications that help MSMEs who do not have an accounting background to be able to do financial records. Financial records are vital for MSMEs, especially in making decisions. For example, a financial application in the form of real-time profit and loss recording that combines the cashier feature in it can make FNB SMEs know the profit or loss position of the business they are running.

Fintech and the digital world during the current pandemic conditions are very helpful for MSMEs to create markets, make it easier to access capital and improve company internals. MSMEs usually do not yet have a record of assets, the financial statements so well that many cannot do capital through bank borrowing. With digitalization and fintech, it will certainly make it easier to access capital assistance. In terms of transaction security, initially customers and sellers prioritized cash payment transactions. However, with this pandemic condition, digital payments are prioritized because they pay more attention to security during transactions. One example is using digital payments. The use of digital payments such as GO-Pay can facilitate MSMEs in safer transactions and open wider economic opportunities (Raharja et al, 2020). One of the security measures in other transactions is to use a third party between the seller and the buyer in the transaction or commonly called third-party e-commerce payment. Usually, MSMEs use third-party e-commerce payment services so that online payments run safely and can build trust for both parties (Chen, J.K. 2018).

4.6 Delivery

The COVID crisis has an impact on all aspects of life, including consumer habits. Initially, many consumers who did the dine-in process to eat at a restaurant while enjoying the atmosphere of a restaurant or café have now shifted to using online food delivery services and eating at their homes (Mehrolia, S et al, 2020). The rate of delivery of food products also continues to increase in line with the proliferation of MSMEs engaged in the culinary field. By using online delivery services, MSMEs also gets additional benefits in the form of promotions and testimonials that can increase the value of their products and brands. These business actors must ensure that the food or beverage products sent are safe and of good quality. Therefore, they take advantage of technology, including start-ups that provide special food delivery services by following health protocols. Meanwhile, for some developed countries, the use of drones in delivery services has begun to be developed and implemented (Hwang et al, 2020).

4.7 Human development

Training is an important activity to increase the motivation, skills, and abilities of an entrepreneur. Before the onset of a pandemic, many seminars and training sessions conducted by governments and business incubators, but with the pandemic, face-to-face activities are increasingly restricted access, but many MSMEs still need help and assistance. Therefore, guidance and assistance for MSME actors during the pandemic is certainly a concern for many sectors, especially government institutions. Many government agencies held a digital training using application such as zoom meeting or social media whatsapp to prepare MSME businesses in order to survive during this pandemic as mitigation and recovery solutions. Various kinds of online-based training that can be followed such as basic entrepreneurship training, building entrepreneurial motivation, branding, packaging training, simple financial training, marketing and production process training.

5. Conclusion

From this research, it can be seen that the use of innovation technology for women entrepreneurs engaged in the FNB sector on a micro small medium enterprise scale ranging from production processes, storage, packaging, marketing, delivery processes, financial stages and human development processes that can help women

entrepreneurs to be sustainable during the covid-19 pandemic. For the production process, the technology that can be applied starts from High Pressure Processing, Pulsed electric filed, Cold Plasma, Ultrasound, Control System, Robotics, Software, Information processing, Automation System and Artificial Intelligence technology. After the production stage, the next stage is the storage of raw materials, semi-finished materials and products. The technologies commonly used are Chemicals, Microbes, controlling water content, Food structure, Heat Energy, Combination Technology, Irradiation, Freezer, Chitosan, Pulsed electric, Refrigerator and Vacuum. Furthermore, at the FNB product packaging stage, the technology commonly used is nano technology and smart packaging.

At the marketing stage, the technologies that can be applied include e-commerce, social media, websites and social networking sites. After that, at the financial stage, the technologies used include fintech, digital payments and third-party e-commerce payments. For the delivery process, the technology that can be used is using an online platform, application and drone delivery service. While in the human development process, the technology used includes digital training, application and social media. With the development of food technology innovation, processing and product diversification become a necessity for the FNB industry to survive in this era of the pandemic. Packaged products such as frozen food and processing food to be more durable, ready to eat and practical for consumers are the main attraction in this pandemic era. In addition, the existence of this pandemic has also increased consumer awareness of health so that product innovation in the form of functional food with a focus on increasing immunity and health becomes an additional attraction for consumers.

By leveraging the technological innovation and combining it with the ability of women entrepreneur's entrepreneurial orientation, MSMEs are expected to have a better chance to survive in the era of this pandemic. This statement is reinforced by previous research stated by Hervé, A et al (2020), they even state that companies that are able to combine technological innovation and entrepreneurial orientation abilities can develop their businesses and compete in the global market. In addition, digitalization has a huge impact on product and service excellence (Lee, Y. Y and Falahat, M, 2019). One of the threats of the COVID-19 pandemic is that it has a negative impact on innovation, investment in research and development programs and slows turnover even though innovation can encourage long-term economic growth (Deschryvere M et al, 2020). This is because companies seek to reduce costs to a minimum because during a pandemic companies focus on survival. In pandemic conditions, innovation activities that can be carried out are digitizing with minimal costs (Block et al, 2020) such as utilization and development of applications and software (Kopytov, A et al, 2018). The principle of technological innovation activities applied by women entrepreneurs, especially MSME, is the type of innovation that can save expenses, cut costs and increase sales, assist services and marketing.

This research is expected to provide theoretical contributions in the form of knowledge about mapping innovation technology in MSMEs engaged in FNB owned by women entrepreneurs in the era of the COVID-19 pandemic by combining production process, storage, packaging, marketing, delivery process, financial stage and human development process. This research is expected to be a reference for MSME practitioners in the field of FNB to apply these technologies so that they can survive and thrive amidst a pandemic.

This study focuses on mapping the technology used by MSMEs engaged in FNB owned by women entrepreneurs in the era of the Covid-19 pandemic. So that further research is expected to be able to explore in more detail the types of technology used. The development of technology will be growing so hopefully in the future studies can add and complement the types of technologies used in the FNB sector for MSME.

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Impact Assessment of a Radiant University-Wide Program in Entrepreneurship Education. The Case of University of Oradea, Romania

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Abstract: This impact evaluation of entrepreneurship education in the Romanian higher education context demonstrates the positive effect that the radiant university-wide program model has on Bachelor students from various fields of study in Romania. Data were collected from 178 Bachelor students from 14 fields of studies (from all fundamental fields of study except Economics and Business Administration) enrolled in the "Entrepreneur for the future" (AntreV) project, financed by the European Social Fund, at University of Oradea, Romania, during 2019-2021. This paper presents the findings of research carried out to assess the impact of AntreV program from the students' perspective. Based on a questionnaire applied at the end of the entrepreneurship program, there were measured aspects such as understanding the basic concepts, the relevance of courses, beliefs modeling, active learning, teacher-student relationship, motivation, course organization, flexibility, assessment of knowledge acquired, suggestions to improve courses and demographics. The results showed that the AntreV program has generated improvements in the students' entrepreneurial knowledge and their entrepreneurial attitude. The students who took part in the AntreV program were more likely to start their own business in their field of study, which allows us to highlight some clear advantages of a radiant university-wide program model in entrepreneurship education not only from the perspective of entrepreneurship but also from the perspective of employability. The paper presents the students' assessment of the first radiant university-wide type program in entrepreneurship education applied in Romania for all fundamental fields of study. The research results are gratifying and open the perspective of a broad rethinking of entrepreneurship education in Romanian universities outside the Economics faculties and Business schools.

Keywords: student entrepreneurship, entrepreneurship education, impact assessment, radiant university-wide program, Romania

1. Introduction: Impact assessment of the entrepreneurship education programs

The entrepreneurship education assessment and the impact of entrepreneurship programs are largely debated topics in the field of entrepreneurship education (Fayolle, 2018, Huang-Saad, Morton and Libarkin, 2018; Pittaway and Cope, 2007). While there has been significant research that proves a positive impact of entrepreneurship education on students' entrepreneurial intentions (Fayolle and Gailly, 2015; Liñán and Fayolle, 2015; Liñán, Rodríguez-Cohard and Rueda-Cantuche, 2011), some studies claim the opposite, arguing that entrepreneurship education rather prepares students for work, increasing risk aversion and inhibiting entrepreneurial intention (Fretschner and Weber, 2013).

Most studies on the impact of entrepreneurship education are based on the social cognitive theory (Bandura, 1986,1997) and the theory of planned behaviour (Ajzen, 1991, 2011). These studies start from the premise that becoming an entrepreneur is a consciously planned behavior and analyze the interaction between attitudes, intentions, and behavior (Newman et al., 2019; Entrialgo and Iglesias, 2016; Rauch and Hulsink, 2015). Other studies try to capture the impact of entrepreneurship education on actual successful entrepreneurial behavior (Fayolle, 2018; Fayolle, Gailly and Lassas-Clerc, 2006; Rauch and Frese, 2000). The results from behavioral research on entrepreneurship education assessment are inconclusive. However, there is a certainty that entrepreneurship programs graduates have a higher frequency of becoming entrepreneurs (Lakeus, 2015). Also, there is consensus that the students' preconditions have a relevant impact on the students' entrepreneurial intentions (Fayolle, 2018; Fayolle and Gailly, 2015). The elective programs, practically oriented courses, team-based approaches, active learning, and experiential entrepreneurship courses proving to have a much greater impact on the students' entrepreneurial intentions (Karimi et al., 2016; Piperopoulos and Dimov, 2015). Very

interesting findings are related to the positive impact on students' engagement of the model of constructive alignment in entrepreneurship education design (Scott, 2019). Compared to other fields of education (medicine, engineering, law, economics, etc.) in which the role of education is undeniable, for entrepreneurship education is difficult to isolate the role of the entrepreneurial program in acting entrepreneurially in the future (Fayolle, 2018; Lakeus, 2015).

Therefore, the need to refine the methods of assessment of entrepreneurship education is increasingly invoked, with an increasing emphasis on the learner's perspective. As Lakeus shows, the methods that are underlying positive cases based on learners' perspective, rather than other stakeholders' perspective, should be made known because "it is difficult for others to reliably guess what learners experienced and appreciated at an educational intervention" (Lakeus, 2015: 21).

Numerous empirical studies and study cases explore the impact of entrepreneurship programs in higher education, including Romania (Vodă and Florea, 2019; Alexe et. al., 2018; Leovaridis, Frunzaru and Cismaru, 2016), but not too many based on learners' perspective. Also, even the entrepreneurship education extension beyond Economics faculties and Business schools is often claimed related to the entrepreneurial profile of the university (Turner and Gianiodis, 2018; Maresch et al., 2016), there is a lack of empirical evidence or study cases about cross-campus or radiant university-wide programs in entrepreneurship education (Krabel, 2018; Schneider, 2015).

In this context, our impact assessment of entrepreneurship education in the case of the University of Oradea, Romania, based on students' perspective demonstrates the positive effect that a radiant university-wide (cross-campus) program has on students from different fields of study, except Economics and Business Administration. Data were collected from 178 undergraduate students from 14 specializations in all fundamental fields of studies - Engineering Sciences, Health, Math and Natural Sciences, Social Sciences, Humanities, and Arts. The respondents are enrolled in a project entitled "Entrepreneur for the future" (AntreV) (Dodescu and Caus, 2020), financed by the European Social Fund, and currently implemented by University of Oradea. To assess the impact of the AntreV program from the students' perspective, a questionnaire was applied at the end of the entrepreneurial program. There were measured aspects such as understanding the basic concepts, the relevance of courses, beliefs modeling, active learning, teacher-student relationship, motivation, course organization, flexibility, assessment of knowledge acquired, suggestions to improve courses, and demographics. The analysis was performed using the SPSS statistical package.

The rest of the paper is structured as follows: Section 2 overviews the research methodology and the respondents' characteristics, Section 3 presents the results and findings of our empirical estimation, section 4 discusses the results and section 5 concludes the paper.

2. Research methodology

The research on the impact of entrepreneurship education on non-economics students was conducted on 450 students who attended an *Entrepreneurship Competencies* course at the University of Oradea, within the AntreV project. The *Entrepreneurship Competencies* course took place between October and December 2020, lasted 56 hours, of which 42 hours of theoretical training and 14 hours of practical training. The *Entrepreneurship Competencies* course was organized in 14 learning sequences as follows: *Reasons, skills and sources for business ideas* (Reasons to become an entrepreneur; Qualities, skills and abilities needed for a successful entrepreneur; Sources to get a good business idea); *The decision to invest and the identification of opportunities* (The decision to invest; The identification and evaluation of opportunities in the business environment); *Understanding of the business environment* (Choosing and validating the business idea; The influence of the external environment on the new business; How can the business be authorized?); *Business authorization* (Choosing the form of authorization; The process of authorizing a business in Romania; Let's recap the possibilities); *The customers and their behaviour* (From consumers to customers - to whom will I sell?; Factors that influence customer behaviour; Buying behaviour, customer attraction and retention); *Competitors and product sales* (Competitors and their role in the market; Sales techniques and methods; Salesforce design); *Low budget marketing. Resources, skills, capabilities* (Low budget marketing; resources, skills, capabilities); *Estimating the resources needed for a business* (Analysis of the value chain of a business; Knowledge of the activities that make up a business; Production activity (operations); Marketing activity); *Estimating the resources needed for a business* (Research and development activity; Personnel activity; Finance - accounting); *Sources of financing and data sources for a*

business plan (Sources of financing a business; Data sources necessary for drawing up a Business Plan); *Components of a business plan* (Synthesis of the business plan; Business; Market; Management and personnel; Financial forecasts); *Elaboration of a business plan* (Examples); *Preparation of the Business Plan on the field of study.*

The research tool used was a questionnaire with 10 questions, with answer possibilities with 4-point Likert scales: Total agreement, Agreement, Disagreement, and Total disagreement, which covered the following topics: *Understanding the fundamental concepts of entrepreneurship* - 5 items; *Relevance of the Entrepreneurship Competencies course* - 5 items; *Modeling beliefs during course activities* - 6 items; *Active learning* - 5 items; *Teacher-student relationship* - 5 items; *Motivation to participate and acquire entrepreneurial skills* - 6 items; *How to organize the course* - 6 items; *Teacher flexibility in establishing the pace of learning and communication with students* - 5 items; *Evaluation of the course of entrepreneurial skills* - 5 items; *Demographic aspects* - 5 items. The questionnaire was applied online to a total of 450 students, with a response rate of 39.55% (178 validated responses). The analysis was performed using the SPSS statistical package. The general distribution of the data is shown in Table 1 below.

Table 1: Distribution of respondents by general socio-demographic characteristics

Aspects related demographic characteristic	No. of respondents	Percentage
Age		
20-24 years	149	83.7%
25-45 years	29	16.3%
Gender		
Female	123	69.1%
Male	53	30.9%
The faculty where the student is enrolled		
Faculty of Arts	2	1.1%
Faculty of Construction, Cadastre and Architecture	6	3.4%
Faculty of Law	12	6.7%
Faculty of Geography, Tourism and Sports	13	7.3%
Faculty of Informatics and Sciences	10	5.6%
Faculty of Electrical Engineering and Information Technology	13	7.3%
Faculty of Energy Engineering and Industrial Management	9	5.1%
Faculty of Managerial and Technological Engineering	7	3.9%
Faculty of History, International Relations, Political Science and Communication Sciences	9	5.1%
Faculty of Letters	2	1.1%
Faculty of Medicine and Pharmacy	37	20.8%
Faculty of Environmental Protection	26	14.6%
Faculty of Socio-Human Sciences	28	15.7%
Faculty of Orthodox Theology “Bishop Dr. Vasile Coman”	4	2.2%
Total	178	100.0

3. Results and findings

The respondents are students enrolled in all faculties of the University of Oradea except the Faculty of Economic Sciences, where they do not have any other training course in entrepreneurship. The surveyed students are enrolled in the final year of undergraduate studies in the following fields: Engineering Sciences (Faculty of Energy Engineering and Industrial Management; Faculty of Managerial and Technological Engineering; Faculty of Electrical Engineering and Information Technology; Faculty of Environmental Protection; Faculty of Construction, Cadastre, and Architecture) - 34.26% (61 students); Social Sciences (Faculty of Socio-Human Sciences; Faculty of History, International Relations, Political Science and Communication Sciences; Faculty of Law; Faculty of

Letters; Faculty of Orthodox Theology ‘‘Bishop Dr. Vasile Coman”; Faculty of Arts) - 32 .02% (57 students); Biological and Biomedical Sciences (Faculty of Medicine and Pharmacy) - 20.8% (37 students); Science and Sports and Physical Education (Faculty of Informatics and Sciences; Faculty of Geography, Tourism, and Sports) - 12.92% (23 students). Most respondents are between 20 and 24 years old (83.7%), 16.3% are non-traditional students (between 25 and 45 years old); 69.1% are women, 30.9% are men.

The opinions of the respondents regarding the understanding of the fundamental concepts of entrepreneurship - are extremely positive - they express their agreement and total agreement with the statements: *‘‘The course focuses on the description of the fundamental concepts”* - 98.3%; *“The courses describe exactly the key elements”* - 95.5%; “*The course is not overloaded with unnecessary information”* - 79.7%; *“I understood, during the courses, the fundamental concepts”* - 95.5%.

Regarding the relevance of the Entrepreneurship Competencies course - the students’ opinions are extremely positive, they express their agreement and total agreement with the statements: *‘‘During the courses, I managed to understand the relevance of the subjects taught”* - 93.2%; *“The theoretical part was completed with practical applications”* - 91.6%; *“Local examples were used to substantiate the relevance of the subjects taught”* - 93.8%; “*I was able to understand the relevance of the courses because examples from reality were also used”* - 93.3%; “*Topics and current issues were mentioned to make the course more interesting*” - 96%.

The students consider that following the debates there was the modeling of beliefs during the course activities - them being in agreement or total agreement in an overwhelming proportion: *“At the courses, we were presented different points of view”* - 92.1%; *“After attending the courses I managed to better understand the basic concepts”* - 95.5%; *“I became more flexible in the learning process”* - 85.4%; “*There were cases in which teachers made us think deeply about important topics taught in this course”* - 91%; “*The courses seem to me to be challenging”* - 83.7%; *“Now I am more willing to change my mind and accept new ideas”* - 89.1%.

The answers are in the same positive note regarding active learning, the students express their agreement and total agreement in majority proportions: *“Several types of teaching were used”* - 84.2%; *“Students have the opportunity to actively participate in courses”* - 97.2%; *“Activities are organized that encourage the application of accumulated knowledge”* - 92.2%; *“In classes students debate the topics taught”* - 87.6%; *“Teachers encourage debates during classes”* - 9%.

The teacher-student relationship was very well appreciated, the respondents expressed their agreement and total agreement for the statements: “*Teachers understand the requirements of students in terms of teaching”* - 95.5%; *“There is a friendly relationship between teachers and students”* - 94.4%; *“Communication between teachers and students is good”* - 95.5%; “*Teachers know all the students who participate in the course”* - 81.5%; *“Teachers are attentive to the educational progress of each student”* - 85.9%.

The motivation to participate and acquire entrepreneurial skills is part of the same positive results: *“High expectations of this course led me to learn”* - 83.2%; “*Teachers are enthusiastic”* - 93.8%; *“The atmosphere at the courses is pleasant”* - 97.2%; “*The courses are interesting”* - 95%; *“Teachers encourage us to surpass ourselves”* - 94.4%; *“Courses are demanding but we learn a lot of new things”* - 89.9%.

The organization of the Entrepreneurship Competencies course was very appreciated: *‘‘The courses are well organized”* - 94.3%; “*The courses are well planned”* - 93.3%; “*The classrooms are well organized”* - 77.6%; *“The expected results of the courses were clear”* - 89.3%; “*Teaching activities helped us to achieve the expected learning outcomes”* - 91.5%; “*The courses were well adapted to our needs”* - 95%.

Regarding the teacher”s flexibility in establishing the pace of learning and communication with the students - the opinions expressed are very positive, the students expressed their agreement and total agreement as follows: *“The teachers helped me when I had difficulty understanding the concepts”* - 97.2 %; *“Teachers are receptive to feedback received from students”* - 98.9%; *“Teachers interact with students during classes”* - 98.6%; *“Teachers answer questions asked by students”* - 98.8%; *“The teaching method was improved following the feedback received from students”* - 94.4%.

An essential aspect of the educational activities in entrepreneurship is the evaluation of the Entrepreneurship Competencies course. After completing the 56 hours, the students considered that the evaluation method used in this educational program is very good. Their answers are part of the same assessments - agreement and total agreement as it results from Table no. 2.

Table 2: Evaluation of the *Entrepreneurship Competencies* course

		Frequency	Percent	Valid Percent	Cumulative Percent
"The type of assessment is closely related to the expected learning outcomes"					
Valid		1	.6	.6	.6
	Agreement	115	64.6	64.6	65.2
	Total agreement	54	30.3	30.3	95.5
	Disagreement	8	4.5	4.5	100.0
	Total	178	100.0	100.0	
"*The evaluation tested our understanding of key concepts*"					
Valid		3	1.7	1.7	1.7
	Agreement	105	59.0	59.0	60.7
	Total agreement	63	35.4	35.4	96.1
	Disagreement	6	3.4	3.4	99.4
	Total	1	.6	.6	100.0
		178	100.0	100.0	
"*To cope with the courses, the students need to have good analysis skills*"					
Valid		1	.6	.6	.6
	Agreement	110	61.8	61.8	62.4
	Total agreement	49	27.5	27.5	89.9
	Disagreement	18	10.1	10.1	100.0
	Total	178	100.0	100.0	
"Several evaluation methods were used"					
Valid		3	1.7	1.7	1.7
	Agreement	109	61.2	61.2	62.9
	Total agreement	48	27.0	27.0	89.9
	Disagreement	17	9.6	9.6	99.4
	Total	1	.6	.6	100.0
		178	100.0	100.0	
"*Assessments are valid tests of course objectives*"					
Valid		3	1.7	1.7	1.7
	Agreement	109	61.2	61.2	62.9
	Total agreement	58	32.6	32.6	95.5
	Disagreement	7	3.9	3.9	99.4
	Total	1	.6	.6	100.0
		178	100.0	100.0	

From the analysis of the answers of the students who benefited from the activities of the AntreV project, we summarise the following recommendations which, in the opinion of the respondents, could improve the *Entrepreneurship Competencies* courses: the courses should be held "face to face" not online; through innovative projects; by inviting entrepreneurs to present real cases; through practical activity and focused strictly on the field of each student; compiling a fixed program of courses; courses should be shorter and taught by entrepreneurs, not teachers; more practical activities; bringing in successful entrepreneurs to hold seminars; by using the so-called "role play" learning method; through discussions with renowned entrepreneurs; more practical activity; several practical applications that exemplify theoretical notions and create edifying scenarios.

4. Discussions

The evaluation of the *Entrepreneurship Competencies* course from the students' perspective is more than gratifying. The things the students appreciated the most were the course support focused on the description of the fundamental concepts, key elements, not overloaded with unnecessary information; practical applications, examples from local context; attentive and preoccupied teachers about the educational progress of each student, friendly relationship between teachers and students; the good organization of the course and the pleasant atmosphere. The students also appreciated the fact that although the courses were demanding, they

learned a lot of new things and as their feedback matters, the teaching methods were improved following their feedback.

According to Lakeus, we should make known the methods underlying this program positively evaluated by students.

We must first show that the general course support is elaborated by a group of Economics and Business experts from different Romanian faculties in a previous project and it was customized within the AntreV project on each field of study. The purpose was to offer students examples related to their field of study and as close as possible to the local business environment, show them why it is palpable, verifiable in the local context.

Secondly, the teachers were specialists in the student's field of study and trained in entrepreneurship within the AntreV program so that they can also translate entrepreneurial knowledge into the language specific to each field of study.

Thirdly, with a boost due to the Covid19 pandemic, the courses were translated into an e-learning format on the university e-learning platform, which determined an additional effort of synthesis, but at the same time allowed the possibility to post a large volume of information (general course support, practical applications, examples, additional materials, questionnaires, self-assessment, quizzes, etc.) but with attention to the synthesis of essential information provided to students. The pandemic also led to teaching courses in an online format which as it turned out was one of the elements that students would change to the program in the future if they had the option.

Fourth, it must be mentioned that there was a monitoring team that constantly followed the rigorous planning and good organization of the program with the main goal of student satisfaction. This team included a specialist in entrepreneurship education, a specialist in inclusive entrepreneurship, an ICT expert, and a non-discrimination and social innovation expert.

Trainers specialized in the field of study of students also trained in entrepreneurship and educational design, customization of course support by fields of study and strong monitoring team were, in our opinion, the strengths behind the AntreV program that determines the positive appreciation of students.

These strengths would not have been possible without the two essential elements – on the one hand, the entrepreneurial orientation of the university sustained by the vision of the strategic management to spread the entrepreneurship education in all the faculties and, on the other hand, the winning of financial support from the European Social Fund through competition of projects at the national level.

We are sure that a similar program developed within the Faculty of Economic Sciences with general course support applicable to all the fields of study and with trainers within this faculty would not have received the same appreciation from the students. Accordingly, we are in favor of the dissemination of this university-wide type of program in universities in general and in Romania, in particular.

It is certainly debatable whether this type of program can be further supported after the completion of the project and financial support. The *Entrepreneurship* course has been introduced in the curriculum of all faculties and can be chosen by the student in the future as an elective course. The trainers trained in entrepreneurship remain within the faculty and will be interested in attracting students for the *Entrepreneurship* course if this course will be paid from the university funds.

Finally, we want to discuss the fact that the exam at the end of the course was positively appreciated by the students and here we consider that the individualized help given by the trainers to each student to succeed with his or her business idea and business plan was essential. We consider that the attention for inclusiveness and the lack of competitive pressure is behind the positive appreciation of the students regarding the evaluation.

Moreover, we consider it important that becoming an entrepreneur at the end of the course was no pressure. If students had felt this pressure their assessment would have been less positive. At the heart of the course was the idea that everyone should take an entrepreneurship course whether or not they want to become

entrepreneurs or self-employed in the future, they must have access to these skills and this type of learning experience to become more employable or better employers in their field of study.

What we consider valuable after this experience is the confirmation that when you tailor a course to the needs of the learner, it is most likely to suit them and make them feel comfortable.

5. Conclusions

This study provides the learners' perspective about an entrepreneurship program assessment, in the case of University of Oradea, Romania. The peculiarity of the program consists in the fact that it is offered cross-campus, to all existing fields of study in the University of Oradea, outside the Faculty of Economic Sciences, in a radiant wide-university approach. The University of Oradea is a comprehensive one, having in its composition all fundamental fields of study from engineering sciences to medicine, law, arts, and theology. Our research shows that students do not consider it an obstacle that they do not have economic skills, on the contrary, regardless of the field of study, they consider that entrepreneurial training is useful even for their future career, opening the perspective of a broad rethinking of entrepreneurship education in Romanian universities outside the Economics and Business administration faculties. As the literature shows, cross-campus programs are more appealing for students. The students who took part in the AntreV program were more likely to start their own business in their field of study, highlighting some clear advantages of a radiant university-wide program model in entrepreneurship education not only from the perspective of entrepreneurship but also from the perspective of employability. The fact that they learn entrepreneurship in their faculty, with trainers of entrepreneurial skills specialized in their field of study, with the choice of the business idea and the elaboration of the business plan in correlation with their field of study make the entrepreneurial training experience accessible and enjoyable.

The students' recommendations confirm research in the field about the positive impact of an elective program, and preference for practically oriented courses, team-based approaches, active learning, experiential entrepreneurship courses. The request for successful entrepreneurs as trainers is worth investigating further concerning "role models".

The next steps in exploring the present paper topic will aim to evaluate the impact of the AntreV program on students' entrepreneurial intentions and to understand the transmission mechanism of the entrepreneurship education benefits to students' entrepreneurial intentions. The research will be conducted using the pre-test-post-test methodology based on a questionnaire completed at the beginning and the end of the program.

The future research development will aim towards the interaction between entrepreneurial education and the academic performance of the AntreV program students to demonstrate that the radiant university-wide model in entrepreneurship education could improve academic performance through the development of non-cognitive competencies. Future steps will focus on the correlation and prediction analysis between self-assessment (decision-making capacity, personality profile, interests, values - based on the cognitive tests applied within the project; intentions – entrepreneurial intentions, career goal, targeted profession, resources needed - based on the career plan realized within the project), assessment (academic average scores, the final grade at the Entrepreneurship Competencies exam) and results (business plan, graduation, master admission).

Managerial and policy implications are related to increasing the attractiveness of the university's educational offer and consolidating its third mission and role in the regional entrepreneurial ecosystem.

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Business Inclusion and Economic Welfare: The Role of Private Sector Credit

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Abstract: The paper seeks to examine the interactive role of private sector credit in explaining the relationship between business inclusion and economic welfare in Africa. First, it intends to investigate the interrelationship between business inclusion and economic welfare and how both business inclusion and private sector credit drive economic welfare. Given that this is a complex relationship, the study employs the seemingly unrelated regression and bootstrap quantile regression in a panel of 52 economies in Africa, over the period 2006-2018. We find that ease of doing business and business accounts have a positive and significant effect on economic welfare. The results show that economic welfare promotes business inclusion. We show that countries that expand more credit to the private sector have better incentives to promote ease of doing business. Moreover, businesses that have access to credit have a positive effect on economic welfare that benefits the poor indirectly. We find that ease of doing business and domestic credit to private sector have a positive and significant impact on economic welfare at higher quantile levels. We find evidence to support that ease of doing business substitutes private sector credit to drive economic welfare while account held for business purposes complements private sector credit to drive economic welfare. We show that the marginal effect of business inclusion on economic welfare is greater in countries that expand more credit to the private sector.

Keywords: ease of doing business, business inclusion, private sector credit, economic welfare

1. Introduction

The World Bank (2017) describes business inclusion as a call of action within the business environment that ensures that every business ideas, knowledge, perspectives, approaches and styles are actively engaged to maximize business success. It also describes a situation when many businesses and entrepreneurs have the ease of doing business. This provides regulations that enhance business activities and provides the basis for understanding and improving the regulatory environment for doing business around the world (World Bank, 2017). Also, like financial inclusion, business inclusion is envisaged as very key in every economy (Oteng-Abayie, 2017; Sakyi et al., 2019) because it is seen as an enabler to achieving economic welfare and sustainable development goals.

The objective of this paper is to look at the effect of business inclusion (as measured by ease of doing business and account for business purposes) on economic welfare. Further, it has been argued that high level of business inclusion is often associated with high rate of employment, investment, high income and low-poverty rate (Ibrahim & Olasunkanmi 2019), and hence, economic welfare can only be sustained if significant number of the population are actively involved in business activities. Inclusive businesses are private sector investments specifically targeting low-income market with the purpose of making reasonable profits and creating tangible development impact through the provision of jobs and better income opportunities, as well as services that matter for the poor's life. A good business environment enables private businesses to prosper more and contribute to the economy. The more successful the private sector is and the more businesses are created, the more opportunities there are for employment and economic welfare. While the private sector has been a key contributor to the economic welfare in Asia, it is yet to fully realize its potential in creating share value, which is to promote business models that integrate the low-income segment and directly contributing to economic welfare. According to the World Bank (2017), the main indicator that drives business inclusion is private sector credit. Thus, private sector credit opens doors for easy access to credit facilities and promotes business growth and welfare. Therefore, by increasing credits to the private sector, entrepreneurs and enterprises can enhance their welfare and this will have a spill-over effects on the real sector of the economy. In addition, it is documented that when the private sector has access to credit, it enables them to invest in enterprises and productive assets, which in turn increases job creation (Baidoo et al., 2020), business growth and improves welfare. Thus, the marginal effect of business inclusion on economic welfare strongly depends on private sector credit.

Table 1: Trends in ease of doing business, private sector credit and economic welfare

Year	Ease of Doing Business	Domestic Credit to Private Sector(%GDP)	Private Credit by deposit money bank (%GDP)	Real GDP per capita
2006	130.07	19.20	25.38	7.14
2007	130.06	20.26	27.58	7.18
2008	127.32	21.07	31.89	7.20
2009	126.40	21.98	37.75	7.20
2010	120.90	23.33	41.02	7.23
2011	117.94	24.47	24.34	7.24
2012	131.03	25.56	24.87	7.30
2013	131.06	25.98	25.98	7.31
2014	142.84	26.61	26.98	7.33
2015	122.73	28.31	29.32	7.33
2016	132.28	28.33	30.81	7.33
2017	129.82	27.92	28.52	7.35
Average	**128.54**	**24.42**	**29.54**	**7.26**

Source: Table by Author based on Data from Doing Business project (*http://www.doingbusiness.org/*) and World Development Indicators database

From Table 1, the average ease of doing business in Africa is 128.54. Over the period 2006-2017, the ease of doing business in Africa has shown an unstable trend but it decreased generally from 130.07 in 2006 to 129.82 in 2017. This implies that the ease of doing business in Africa needs a serious attention. In relation to private sector credit, domestic credit to private sector has shown an increasing trend over the 2006-2016 periods but at a slower rate while private credit by deposit money bank has shown an unstable trend over the same period in Africa.

2. Brief literature review

2.1 Theoretical literature

The finance-inequality hypothesis explained by Clarke et al. (2006) suggest that financial development benefits the high-income group. The lower income group who relatively lacks access to credit to expand their wealth and create value for their business. The lower income group may be equipped with only primary education and later joins the unskilled labour market and earn lower wages which in turn reduces welfare. According to the hypothesis, the shortfalls in the financial markets deter the low-income earners from patronizing financial services such as borrowing adequate to invest in human and physical capital. Thus, the finance-inequality hypothesis can be used to explain the interrelationship between inclusive business, Private sector credit and economic welfare. Individuals who inherit less wealth will remain unskilled, not be able to enter into business, and be able to access loan facility and this can go on from one generation to another. The hypothesis, however advances its argument that private sector credit expands business activities and broadens access to credit through financial development which provides an avenue for the poor to borrow for wealth creation, human capital investments and improve their earning potentials which in turn also enhance their welfare. This implies that as the private sector expands and there is rapid economic growth, economic welfare between the rich and the poor widens. On the other hand, private sector credit widens financial access to the real sector of the economy, resulting into greater welfare.

2.2 Empirical studies

To link business inclusion to economic welfare, most studies in the literature centers on the effect of ease of doing business on development and growth (Canare, 2018). A few of them looked at ease of doing business' effects on entrepreneurship and starting a business. Empirical works by Fonseca et al, (2001), Klapper et al, (2004) and Dreher and Gassebner (2013) found that institutional entry barriers negatively affect entrepreneurship and further affect firm creation. In linking business and economic welfare, inclusive business is seen as the engine for improving economic growth and productivity especially in developing economies (Swedberg, 2009) like those in Africa where standard of living and welfare lacks behind compared to economies in other continents. Klapper, Laeven and Rajan (2004) conducted a study to determine the impact of the business environment on new firm's entry into an economy and found that high regulatory barriers to entry hinders business entry. Canare (2018) looked at the effect of ease of doing business on firm creation and found that the

overall ease of doing business has a positive effect on business creation. In addition, the effect of the starting a business component is driven by the financial cost. From the perspective of ease of doing business and economic welfare relationship, Adepoju (2017) provided evidence to support that ease of doing business has an overall statistically significant impact on the annual growth rate of GDP per capita. They concluded that the ease of doing business is an important factor for economic growth, but that the effect caries across groups of countries. Canare (2018) looked at the effect of ease of doing business on firm creation, using a panel dataset of 120 countries over 9-year period from the World Bank's Ease of Doing Business Reports. The results show that the overall ease of doing business has a positive effect on business creation.

Drawing from the above stylized facts, theoretical and empirical studies, the paper formulate the following hypothesis:

H_1 There is a bi-causal relationship between business inclusion and economic welfare

H_2: The independent impact of business inclusion and Private sector credit on economic welfare varies at different quantile levels.

H_3: The effect of business inclusion on economic welfare is greater at higher levels of Private sector credit

3. Methodology

We construct a panel dataset of 52 African economies. The sample covers 13 years from 2006 to 2018, a period spanning different economic and business conditions.

3.1 Model specification

3.1.1 Relationship between business inclusion and economic welfare

We apply the seemingly unrelated regression to deal with possible endogeneity of business inclusion on economic welfare.

Following our baseline equation, we specify this simultaneous relationship as follows:

$$Economic\ Welfare_{jt} = \beta_0 + \beta_1 Business\ Inclusion_{jt} + \sum_{k=2}^{N} \beta_k C_{jt} + \ \varepsilon_{ijt} \quad (1)$$

$$Business\ Inclusion_{jt} = \lambda_0 + \lambda_1 Economic\ Welfare_{jt} + \sum_{k=2}^{N} \lambda_k C_{jt} + \ \varepsilon_{jt} \quad (2)$$

where subscript *j* denotes cross sectional dimension (country specifics), *j* = 1, …, M; t denotes the time series dimension (time), t = 1, …, T.

β_0 and $\lambda_0$are constant terms in the model; $\beta_1\ and\ \lambda_1$ represent the coefficient of business inclusion and economic welfare respectively; β_k, λ_k: k = 2,…, N, represent the regression coefficient parameters for vector C to be estimated. C is a vector of control variables that explain the two equation models.

ε_{jt} is idiosyncratic error term, which controls for unit-specific residual in the model for the *j^{th} country* at *period t*.

We measure Economic Welfare using real GDP per capita. Data on Economic Welfare was obtained from the Global Financial Development database. Business Inclusion is decomposed into two indicators: (1) Ease of Doing Business and (2) Accounts for Business Purposes. Data on Ease of Doing Business was obtained from the World Bank database of Ease of Doing Business Index. Accounts for Business Purposes was obtained from the Global Financial Development database.

From the above model, a positive relationship between business inclusion and economic welfare is expected. This suggests that countries that build their capacity to promote businesses are able to increase economic welfare. Thus, good business engagements drive greater economic welfare. The study also expects a positive effect of economic welfare on business inclusion. This implies that countries that develop the welfare of their people or the real sector are able to engage the activities of businesses.

3.1.2 Impact of business inclusion and private sector credit on economic welfare

We examine the role of Private sector credit in explaining the relationship between business inclusion and economic welfare, we specify the model by expanding equation 2 in this form:

$$Economic\ Welfare_{jt} = \sum_{l=1}^{3} \alpha_l Business\ Inclusion\ Variables_{\ jt} + \sum_{k=4}^{N} \alpha_k Private\ Sector\ Credit\ Indicators_{jt,t-1} + \sum_{p=1}^{3} \Omega_p (Business\ Inclusion\ Variables_{\ jt} * Private\ Sector\ Credit\ Indicators_{jt}) + \sum_{k=1}^{N} \beta_k X_{jt} + \gamma_j + \mu_t + \varepsilon_{jt} \quad (3)$$

We decompose private sector credit indicators into two: (1) Domestic credit to private sector and (2) private credit by deposit money bank. Data on Private sector credit variables were obtained from the Global Financial Development database of the World Bank.

3.1.3 Interaction effects

In this model, we are interested in whether business inclusion complements or substitutes private sector credit to affect economic welfare. We do this by observing the signs and level of significance attached to: (1) the coefficients of the variables and (2) the interaction terms.

Following Compton and Giedeman (2011), we interpret our results based on whether business inclusion and private sector credits are complements or substitutes in explaining economic welfare. Table 2 shows the expectations of the variables used in the study

Table 2: Summary of control variables

Variable	Measurement	Expected Sign
Dependent Variable		
Economic Welfare	Gross domestic product per capita	
Variables of Interest		
Ease of Doing Business	Ten Criteria for doing business as measured by the World Bank	+
Business Account	Account for Business Purpose, measured as a dummy equal 1, if a country recorded business account in a particular year, 0 otherwise.	+/-
Domestic Credit to Private Sector	percentage of domestic credit to private sector to gross domestic product	+
Private Credit by Deposit money bank	percentage of private sector credit by deposit money bank to gross domestic product	+
Control Variables		
Trade Openness	percentage of export plus import to gross domestic product	-/+
Industry Employment	Percentage of industry employment to total employment	+
Foreign Direct Investment	percentage of foreign direct investment to gross domestic product	-/+
Gross Capital Formation Growth	Year-on-year percentage change in gross capital formation to gross domestic product	+
Inflation Rate	consumer price index	-/+
Population	percentage change in year-on-year population or natural log of total population	-/+
Human Development Index	Ranges between 1 and 0 and computed as a function of education, health and income of an economic	+

Data on ease of doing business obtained from Doing Business project (*http://www.doingbusiness.org/*) and all other variables obtained from World Development Indicators database

4. Empirical results

4.1 Descriptive statistics and correlation

The descriptive statistics (Table 3) is used to screen for outliers which have the possibility of adversely influencing the accuracy, consistency and efficiency of the results. Using the mean, maximum and minimum values of the variables, there is no evidence of outliers.

Table 3: Descriptive statistics

Variables	Mean	Std. Dev.	Min	Max
Economic Welfare	7.097	1.047	5.102	9.929
Ease of Doing Business	65.731	18.407	2.206	95.131
Business Account	0.49	0.5	0	1
Trade Openness	.693	0.35	0.191	3.762
Domestic Credit to Private Sector	20.494	23.132	0.403	160.125
Private Credit by Banks	23.35	45.143	0.048	106.383
Industry Employment	13.367	8.018	1.704	40.37
Foreign Direct Investment	4.036	9.132	-8.589	161.824
Gross Capital Formation	21.575	9.888	-2.424	85.101
Inflation Rate	7.74	6.259	-2.409	44.357
Population Growth	2.379	1.085	-6.766	8.118
Human Development Index	0.486	0.133	0.199	0.871

Additionally, Pearson's correlation matrix (Table 4) is used to screen for multicollinearity and evidence of multicollinearity is found when the multicollinearity threshold is set to 0.5 (see York, 2012).

Table 4: Correlation matrix

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Economic Welfare		1.000											
(2) Ease of Doing Business	1.07	0.051	1.000										
(3) Business Account	1.02	-0.014	-0.017	1.000									
(4) Trade Openness	1.55	0.433	0.012	0.014	1.000								
(5) Domestic Credit to Private Sector	1.96	0.438	-0.100	-0.038	0.140	1.000							
(6) Private Credit by Banks	1.55	0.175	-0.058	0.016	0.293	0.424	1.000						
(7) Industry Employment	2.42	0.683	0.004	-0.023	0.310	0.531	0.234	1.000					
(8) Foreign Direct Investment	1.31	0.040	0.025	0.020	0.300	-0.044	0.188	-0.011	1.000				
(9) Gross Capital Formation	1.32	0.366	0.094	-0.072	0.343	0.107	0.024	0.172	0.292	1.000			
(10) Inflation Rate	1.03	-0.038	0.014	0.012	-0.025	-0.042	-0.032	-0.034	-0.015	-0.051	1.000		
(11) Population Growth	1.45	-0.277	-0.016	-0.013	-0.202	-0.361	-0.095	-0.318	0.094	-0.006	0.059	1.000	
(12) Human Development Index	2.43	0.857	-0.004	-0.037	0.369	0.485	0.220	0.734	0.035	0.305	-0.049	-0.359	1.000

4.2 Results and discussion

4.2.1 Interrelationship between business inclusion and economic wealth

The study employs the seemingly unrelated regression model to examine the bi-directional relationship between business inclusion and economic welfare. In Table 5, ease of doing business has a positive and significant effect on economic welfare (model 1). This suggests that ease of doing business propels economic welfare. Similarly, account for business purposes has a positive and significant effect on economic welfare (model 2).

Table 5: Interrelationship between business inclusion and economic wealth

VARIABLES	Impact on Economic Welfare		Impact on Business Inclusion	
			Ease of Doing Business	Business Account
	Model 1	Model 2	Model 3	Model 4
Ease of Doing Business	0.00658***			
	(0.000928)			
Business Account		0.0573*		
		(0.0335)		
Economic Welfare			9.351***	0.0585*
			(1.320)	(0.0342)
Domestic Credit to Private Sector	0.00606***	0.00529***	0.175***	-0.00111
	(0.000890)	(0.000879)	(0.0340)	(0.000906)
Private Credit by Banks	-0.000760*	-0.000959**	0.00578	4.32e-05
	(0.000389)	(0.000388)	(0.0147)	(0.000393)
Trade Openness	0.245***	0.321***	-1.307	0.144**
	(0.0650)	(0.0633)	(2.473)	(0.0648)
Industry Employment	0.00773**	0.00993***	-0.141	0.000189
	(0.00308)	(0.00296)	(0.116)	(0.00302)
Foreign Direct Investment	-0.00790***	-0.00858***	-0.0694	0.00236
	(0.00257)	(0.00255)	(0.0975)	(0.00259)
Gross Capital Formation	0.00663***	0.00910***	0.289***	-0.00239
	(0.00230)	(0.00223)	(0.0867)	(0.00228)
Inflation	0.000535	-0.000140	-0.0773***	0.000356
	(0.000649)	(0.000648)	(0.0243)	(0.000655)
Population Growth	0.0466**	0.0382*	-2.894***	-0.0212
	(0.0205)	(0.0199)	(0.768)	(0.0201)
Human Development Index	5.273***	5.232***	-51.05***	-0.571**
	(0.200)	(0.196)	(10.24)	(0.266)
Country Effect	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
Constant	3.474***	3.810***	32.04***	0.387**
	(0.124)	(0.104)	(6.553)	(0.167)
Observations	791	873	791	873
R-squared	0.763	0.767	0.068	0.016
Chi^2	2641***	2878***	108.20***	17.17*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This shows that entrepreneurs that hold account for business purposes are able to increase economic welfare. Thus, countries that increase business inclusion promote economic welfare. This agrees with the work by Canare (2018), who found that the overall ease of doing business has a positive effect on business creation, which eventually promote economic growth and development (Adepoju, 2017). Thus, countries that increase business inclusion promote economic welfare. The results show a positive impact of economic welfare on ease of doing business and business account. This suggests that economic welfare promotes business inclusion. The implication is that greater economic welfare provides higher income distribution across the real sector of the economy. This leads to greater business inclusion like the possibility for starting a business, expanding existing business, opening more business accounts and increasing the ease of doing business.

Private sector credit, measured with domestic credit to private sector and private credit by deposit money bank has an interesting relationship with economic welfare and business inclusion. For instance, in models 1 and 2, domestic credit to private sector was positively linked to economic welfare and was positively linked to ease of doing business (model 3). Thus, countries that develop and grow their private sector, through credit supplies are able to promote economic welfare. Moreover, it reflects in enhancing the ease of doing business. Domestic credit to private sector was positively linked to economic welfare (models 1 and 2) while private credit by deposit banks was negatively linked to economic welfare (model 2). This suggests an indirect relationship between private sector credit and economic welfare. This is not surprising following the theory of unproductive entrepreneurship (see Baumol, 1996) which shows that entrepreneurship could not necessarily lead to a successful value creation in productivity. In general, we find evidence to support a positive and significant bi-causal linear relationship between business inclusion and economic welfare.

4.2.2 Independent effect of business inclusion and private sector credit on economic welfare

We present the independent effect of business inclusion and Private sector credit on economic welfare based on different thresholds of economic welfare. We perform this to observe the degree of impacts by employing the quantile regression. In Table 6, ease of doing business has a positive and significant impact on economic welfare at the 50th, 75th and 90th quantile while business account has no significant impact. We show that domestic credit to private sector has a positive and significant impact on economic welfare at the 25th, 50th, 75th and 90th quantile levels. The degree of impact increases at greater threshold levels. This suggests that private sector credit promotes economic welfare at higher levels of business environment. More so, credit to private by banks is positively related to economic welfare.

Table 6: Quantile regression: independent effect of business inclusion and private sector credit on economic welfare

VARIABLES	Model 5	Model 6	Model 7	Model 8
Ease of Doing Business	3.88e-05	0.00196***	0.00538***	0.00313**
	(0.00185)	(0.000639)	(0.00144)	(0.00133)
Business Account	0.0372	0.00585	-0.00849	-0.0287
	(0.0575)	(0.0404)	(0.0497)	(0.0384)
Domestic Credit to Private Sector	0.00567***	0.00774***	0.00467***	0.00368***
	(0.00150)	(0.00125)	(0.00164)	(0.00134)
Private Credit by Banks	0.000256	-0.000415	0.000148	0.000363
	(0.000809)	(0.000927)	(0.00150)	(0.00129)
Trade Openness	-0.00970	0.164*	0.383***	0.799***
	(0.0824)	(0.0993)	(0.131)	(0.0901)
Industry Employment	0.0187***	0.0176***	-0.00315	-0.0219***
	(0.00332)	(0.00404)	(0.00616)	(0.00420)
Foreign Direct Investment	-0.00235	-0.00503***	-0.0109***	-0.0164***
	(0.00470)	(0.00128)	(0.00178)	(0.00243)
Gross Capital Formation	0.0125***	0.00648***	-0.00386	-0.00467
	(0.00212)	(0.00185)	(0.00370)	(0.00295)
Inflation	-0.000175	-0.000590	0.00170	0.00174
	(0.00173)	(0.00130)	(0.00157)	(0.00107)
Population Growth	-0.0801**	-0.0286	0.148*	-0.0186
	(0.0331)	(0.0213)	(0.0805)	(0.0454)
Human Development Index	4.041***	3.897***	6.642***	6.841***
	(0.169)	(0.341)	(0.458)	(0.204)
Country Effect	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
Constant	4.257***	4.429***	3.319***	4.125***
	(0.225)	(0.157)	(0.317)	(0.190)
Observations	789	789	789	789
Pseudo R-sq	0.5261	0.5548	0.5514	0.5640

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This means that good business environment creates more successful private sector and the more businesses are created, the more opportunities there are to start a business and in turn drives economic welfare (Dreher & Gassebner, 2013; Poschke, 2010). The results also show that business inclusion either complements or substitutes private sector credit in impacting economic welfare. Therefore, we interact business inclusion variables with private sector credit indicators and regress on economic welfare.

From Table 7, the coefficient of ease of doing business is positive and significant while the coefficient of the interaction terms between ease of doing business and domestic credit to private sector is negative and significant (model 9). This suggests that ease of doing business substitutes domestic credit to private sector. Similarly, the coefficient of ease of doing business is positive and significant while the coefficient of the interaction terms between ease of doing business and private credit by deposit money banks is negative and significant (model 10). This suggests that ease of doing business substitutes private credit by deposit money banks to impact economic welfare.

Table 7: Interaction effect of business inclusion and private sector credit on economic welfare

VARIABLES	Model 9	Model 10	Model 11	Model 12
Ease of Doing Business	**0.00606*** **	**0.00699*** **		
	(0.00112)	**(0.00116)**		
Business Account			**0.040*** **	**0.022** **
			(0.009)	**(0.009)**
Domestic Credit to Private Sector	**0.0100*** **		**0.00411*** **	
	(0.00149)		**(0.000959)**	
Private Credit by Banks		**0.00966*** **		0.000424
		(0.00150)		(0.000575)
Ease of Doing Business*Domestic Credit to Private Sector	**-0.000101*** **			
	(2.49e-05)			
Ease of Doing Business*Private Credit by Banks		**-0.000165*** **		
		(2.55e-05)		
Business Account*Domestic Credit to Private Sector			**0.043** **	
			(0.019)	
Business Account*Private Credit by Banks				**0.018*** **
				(0.007)
Trade Openness	0.184***	0.162**	0.264***	0.227***
	(0.0603)	(0.0632)	(0.0597)	(0.0631)
Industry Employment	0.00866***	0.0145***	0.00981***	0.0153***
	(0.00299)	(0.00294)	(0.00290)	(0.00291)
Foreign Direct Investment	-0.00922***	-0.00937***	-0.0101***	-0.00983***
	(0.00234)	(0.00257)	(0.00236)	(0.00262)
Gross Capital Formation	0.00778***	0.00884***	0.00914***	0.0103***
	(0.00211)	(0.00230)	(0.00208)	(0.00228)
Inflation	-3.60e-06	0.000315	-2.98e-07	-0.000214
	(2.04e-05)	(0.000653)	(2.09e-05)	(0.000665)
Population Growth	0.0301	0.0153	0.0315	0.0162
	(0.0201)	(0.0202)	(0.0198)	(0.0200)
Human Development Index	5.312***	5.445***	5.279***	5.409***
	(0.191)	(0.198)	(0.190)	(0.199)
Country Effect	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
Constant	3.568***	3.490***	3.852***	3.843***
	(0.127)	(0.132)	(0.104)	(0.107)
Observations	835	793	921	875
R-squared	0.771	0.768	0.766	0.758
Adjusted R-squared	0.7685	0.7648	0.7630	0.7552

VARIABLES	Model 9	Model 10	Model 11	Model 12
Marginal Effect	**0.00399**	**0.00314**	**0.9212**	**0.4423**

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

On the other hand, the coefficient of business account is positive and significant while the coefficient of the interaction terms between business account and domestic credit to private sector is positive and significant (model 11). This suggests that account for business purposes and domestic credit to private sector are complements in shaping economic welfare. Again, the coefficient of business account is positive and significant while the coefficient of the interaction term between business account and private credit by deposit money banks is positive and significant (model 12). This suggests that account for business purposes complements private credit by deposit money banks in shaping economic welfare

In model 11, the positive impact of accounts for business purposes on economic welfare is amplified at higher levels of domestic credit to private sector. Again, the marginal effect of account for business purposes on economic welfare is enhanced at greater levels of private credit by deposit money banks (model 12).

In general, business inclusion increases the economic welfare of people and businesses when the private sector is well developed. Thus, countries that focus on developing their private sector (through credit expansion) are able to engage businesses and individuals (i.e., encourage or facilitate the inclusion of businesses). This has the potential to increase the economic welfare of people and businesses in the real sector of the economy. The control variables are not interpreted because of space.

5. Conclusion

The paper examines the interrelationship between business inclusion, private sector credit and economic welfare. The study employs a panel data of 52 African economies between 2006 and 2018. We find that ease of doing business and business accounts have a positive and significant effect on economic welfare. This shows that business inclusion is able to increase economic welfare. The results show that economic welfare promotes business inclusion. The study found a mixed relationship between private sector credit and economic welfare without controlling for business inclusion. While domestic credit to private sector was positively linked to economic welfare, private credit by deposit banks was negatively linked to economic welfare. This suggests an indirect relationship between private sector credit and economic welfare. We show that the impact of domestic credit to private sector on economic welfare increases at greater threshold levels. Moreover, we find that ease of doing business has a positive and significant impact on economic welfare at higher quantile levels. We find evidence to support that ease of doing business substitutes domestic credit to private sector to drive economic welfare. Again, ease of doing business substitutes private credit by deposit money banks to promote economic welfare. We find that account for business purposes and domestic credit to private sector are complements in shaping economic welfare. Similarly, account for business purposes complements private credit by deposit money banks in shaping economic welfare.

In general, business inclusion increases the economic welfare of people and businesses when the private sector is well developed.

6. Recommendation

The study recommends that countries that strengthen business inclusion should be able to facilitate good business environment which enables private businesses and entrepreneurs to prosper more and contribute better to economic welfare. The implication is that greater economic welfare provides higher income distribution across the real sector of the economy and in turn improves ease of doing business and inclusive business environments. Further, private sector credit promotes ease of doing business. Thus, countries that expand more credit to the private sector should have better incentives to promote business inclusion. Again, countries that focus on developing their private sector (through credit expansion) should engage businesses and individuals (i.e., encourage or facilitate the inclusion of businesses). This has the potential to increase the economic welfare of people and businesses in the real sector of the economy.

Future study should include entrepreneurship or business related during the pandemic situation and also consider qualitative study in their findings

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Changing Online Networking Priorities for Entrepreneurial Self-Development

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Abstract: This paper contributes to understanding opportunities to use social media for developing online networking skills that can be applied in entrepreneurial initiatives. The main research question is: What are opportunities to increase awareness of students about the implications of online social media for networking that supports their entrepreneurial self-development priorities? Online networking priorities of students and their readiness to practice local versus international and traditional versus digital entrepreneurship should be taken into consideration when specifying optional learning paths for developing their networking skills. Analysis of changing priorities followed by business students in finding and using online social networking platforms during the years 2008-2018 demonstrated dominance of Facebook and more recently Instagram, compared to LinkedIn and more specialized networks for entrepreneurs. Students that are involved in knowledge sharing for travelling, sports, music and online gaming, have however more detailed understanding about the community of practice as entrepreneurial self-development tools. Recent years demonstrated some desire to integrate different online communication channels and to create synergy between online networking tools and joint actions in physical locations. Crowdfunding platforms and networks that support knowledge sharing between young entrepreneurs and mentors have the potential to enhance cross-border entrepreneurship readiness. Students need a deeper understanding of how their online communication and networking priorities can be aligned with their entrepreneurial knowledge sharing through social media. Our longitudinal research of student priorities in online social network use demonstrates the importance of understanding self-development paths of students when improving their skills to use social media for entrepreneurship.

Keywords: online social networks, entrepreneurial orientations, networking priorities, community of practice, networking readiness, digital citizenship

1. Introduction

First decades of the 21. century have demonstrated the role of innovations that change the nature of social networking such as Facebook, Instagram, and YouTube. Malerba and McKelvey (2019) stress the interplay between innovation, entrepreneurship and new knowledge sources as the driver of economic, social and cultural development. Online media use has been studied by many researchers from the point of view of marketeers (Sheth 2018). It is a relatively cheap marketing channel, especially for start-ups. Online media should be however seen also as an important tool for learning and knowledge sharing at different stages of business trends analysis, business opportunity identification and searching start-up team members or investors. Online social media has helped to overcome space and time barriers, enabling online networking between young entrepreneurs living in different countries. At the same time, it happens to be a tool for disseminating fake news and attacking the privacy of young people. Recent Covid-19 global emergency with cross-border movement restrictions has demonstrated the importance of online communications skills and benefited these learners and instructors that have been rapid to find the most suitable online learning and networking tools. In other to prepare students to use cross-border knowledge sources enabled by social media for innovative entrepreneurship, the research objective is to understand how students could be better prepared to choose and use social media as a networking tool for entrepreneurship. The central research question is: What are opportunities to increase awareness of students about the implications of online social media for networking that supports their entrepreneurial self-development?

Self-development is a complicated challenge for emerging adults. It involves practices that lead to self-perception and understanding what a person wants to be and establishing priorities to gain the knowledge and skills required for personal growth (Arnett, 2015). Entrepreneurial self-development assumes understanding opportunities and challenges related to entrepreneurial behaviour, preparation for the role of entrepreneur and choices on how to create the resource base, including knowledge and contacts for successful entrepreneurial initiatives. We focus on self-development as knowledge sharing and community of practice involvement that can start already before identifying business opportunities and venture creation. Entrepreneurship educators have to understand online networking practices of students that are driven by their priorities and Internet use practices outside academic studies. Academic courses can, however, assist students to understand better implications of their online media use to developing themselves as entrepreneurs.

2. Literature review

Entrepreneurship education should prepare students for choosing the appropriate networking that corresponds to the innovative nature of their business idea, cross-cultural awareness and readiness to use international contacts. Finding and using professional social networking websites facilitates entrepreneurial learning of high-tech start-ups, as social capital is an important mediator in the relationships between knowledge-seeking activities and entrepreneurial learning (Scarmozzino, Corvello and Grimaldi, 2017). Autio, Dahlander and Frederiksen (2013) present evidence, how online communities can strengthen entrepreneurial action by reducing demand uncertainty as the result of knowledge sharing among community members.

Yang and Lin (2014) explained that joining Facebook offers to members social, hedonistic and epistemic values and users that have different aims of joining and belonging to such social networks draw different benefits from it. Sula and Elenurm (2018) have studied how students use networking opportunities for entrepreneurial learning. Online and offline entrepreneurial ties are mutually complementary. Young students rely equally on online and offline entrepreneurial ties, but they often do not have a clear vision, how to use both weak and strong ties in their networks at different stages of their entrepreneurial journey. Benson and Filippaios (2015) have studied graduates from AMBA-accredited universities and highlight skill gaps between generation Y (born between years 1980-1994) and experienced graduates in using online social networking tools. They point out that although online networking increases the social capital of students and improves collaborative competencies, knowledge construction and sharing skills, still only a few universities provide courses for professional use of online social networks, in the context of business and management.

Trust building in online networks has become an important issue in social media research (Kapoor et al. 2018). Privacy issues of online social media have been during recent years discussed in the context of Facebook privacy scandal related to Cambridge Analytica (Knijnenburg 2018; Liu, Zhou, Zhu, Xiang and Wang 2018) but the need to have user's control over personal content uploaded to social media is a broader issue as even online friends can misuse such content. Preparing students for using online social media assumes understanding the role of trust-building in entrepreneurship and critical thinking when dealing with unreliable information sources and fake news. Critical thinking skills can be developed in participatory experiential learning, where students are exposed to problems faced by entrepreneurs in practice and teamwork is used for developing new product or service ideas (DeSimone and Buzza 2013).

Van Laar, van Deursen, van Dijk and de Haan (2018) treat online networking skills as an essential assumption for digitalization. They recommend developing these skills in several directions: creating communication channels for co-operation, choosing the right goals and intensity of communication, creating own online profile, training self-expression but also critical thinking, information management, creativity and problem-solving. Benson and Morgan (2016) present a framework for pragmatic skills and social platform competencies suggested for university graduates that includes cross-cultural communication, asynchronous textual and visual communication, high-quality persona profile development, appropriate and ethical online content creation and posting, privacy and security settings for supporting information security. Filippaios and Benson (2018) stress the dynamic nature of developing online networking skills that should start from creating a personal online brand to finding and choosing the most suitable online social media and finally lead to discovering new business opportunities with network partners and gaining the status of an online mentor. Engel, Kaandorp and Elfring (2017) explain the role of intelligent altruism in online networking that means sharing knowledge in situations, where there is high uncertainty if other network members will later compensate such efforts by offering any valuable knowledge. Such behaviour is related to empathy and soft skills in interpersonal relations. Bozkurt et al. (2020) analyse both positive and negative aspects of peripherical participation in online learning networks using transactional distance, interaction types and self-determination theories. In our research to are interested in implications of students' experience of online networking on their networking priorities and learning needs.

The literature overview serves as the basis for formulating the following questions for empirical analysis that covered the period from 2008 to 2018, based on student individual contributions and group discussion during *Business in virtual networks* courses that were conducted each year.

- What are the most popular online social media applications among business students for entrepreneurial networking during the recent decade and how these applications are related to dominating platforms and more specialized opportunities for entrepreneurial networking?

- Which are social media application types, where students have more advanced user experience?
- What positive features and gaps students see in existing online media for them as networkers and what kind of new applications they want to develop in the context of entrepreneurship?
- How to prepare students to use online networking for entrepreneurship?

3. Research methodology

The methodological departure point of our approach is action research that reflects self-development activities of business students. Educational action research examines and reflects both the potentials, as well as the challenges, of educational practices centred on learning projects in different formats and with various internal and external partners (Mandrup and Jensen, 2017). We focus on choices that were made by students during the *Business in virtual networks* courses that have been conducted at the Estonian Business School (EBS) from the year 2010. Starting from 2014 the course has been conducted simultaneously in Tallinn and Helsinki campuses of EBS that allowed to create joint online teams for course projects, where each team involved students from both campuses. At first, students were asked to find and review in the course weblog the best online network for business students that they individually identified. The review had to highlight important features of the network and to give examples of the benefits of this network for users. Students were also encouraged to reflect their user experience. Results were commented by other students and online network overviews that offered new information for many students were discussed in detail in group work during the course.

Based on the priorities of students to use online social media and to fill in gaps of the existing social media landscape and create new online networking opportunities for them as business students, course project teams were formed by students. Team formation was a self-regulated process, where students themselves invited team members to join the team. E-learning platform Moodle and during recent years Canvas was used by students combined with a Tricider tool, where students could promote their new network development ideas and other groups member could vote for the best ideas of other students. But students were also encouraged to check information about their potential team members on Facebook, LinkedIn, and other social media. When simultaneous courses were conducted in Tallinn and Helsinki, the diversity rule was applied. Each team had to involve students from both campuses. At the end of the course, teams had to present a simple prototype of a new useful online social networking tool for business students and the report that explains the mission, main features of the tool, value of the network for its members and the potential target group to engage members to this network.

We conducted the content analysis of written information presented by students in their individual assignments, where they had to characterize in the course weblog an existing online social media tool that in the best way serves their needs as business students. Altogether results of 380 homework assignments that were presented by students during eleven years were analysed. Observations during group work sessions of students on lessons learnt from their individual assignments and class discussions after oral presentations that resulted in generating ideas for team-based new network prototype creation projects gave also information in this action research process.

4. Student priorities when choosing between existing online social networking opportunities

Already in 2008 - 2009 Facebook had gained popularity but many students, especially at the Estonian Business School Tallinn campus, still preferred Orkut that was launched by Google in 2004 and shut down in 2014. Active involvement of Estonians as Orkut users can be explained by its integration with other services of Google. Students that promoted these general-purpose social media as their priorities, mainly stressed the importance of such networks for keeping in touch with old friends, especially if they had international mobility. Majority of local Estonian and Finnish students were not able to explain in detail other priorities that they have managed to follow in their online networking practice. Students that were interested in international travel were able to explain in detail functionalities and benefits of such online networks as Wayn travel network, TripAdvisor, Swedish travel network www.resdagboken.com or network of ISIC card owners for discovering new international travel opportunities and finding new travel companions that share similar interests. Students interested in art communities such as www.devianart.com or in music sharing (www.soundcloud.com) expressed the highest degree of enthusiasm in online networking. Students involved in online poker were most able to compare different online platforms for their community. In 2009 some evidence of interest to use learning communities

such as www.tianya.com or network of the Chartered Financial Analyst Society was also identified but only a few students had such priorities.

In 2010 - 2011 Facebook was still the leader but LinkedIn was used by a larger number of students than in earlier years. Facebook users had discovered functionalities of this social media that could be used for online marketing. YouTube had gained popularity as a tool to see what videos one's friends are interested in. Several Estonian students reported some experience of using networks that support smart online buying such as eBay or Estonian local network Buduaar, price comparison tools (www.hinnavaatlus.ee), real estate price forums or currency exchange operations platforms www.forexlive.com. These online commercial interaction tools were mainly assessed form the position of a user, not a contributor. "Somebody updates information there". Assessment criteria explained by students were related to easy login and navigation, reliability of information was not discussed. Some students were involved in non-profit communities for entrepreneurship training that were just founded such as www.arikatel.com that at present are not operating any more as training platforms.

In 2012 - 2013 the active role of travel-oriented students continued, Airbnb was a new focus. More Estonian students were able to explain their networking experience in start-up communities, using www.startupgarage.eu or www.biznik.com for entrepreneurial networking. These online media tools are not operating anymore. Business angel network Angel List (www.Angel.co) deserved student attention for the first time and also crowdfunding platform www.kickstarter.com was promoted with a detailed explanation of its rules. A new trend was promoting networks, where young people can play some game for instance at www.hatrick.org, where coaching a football team can be reflected to develop leadership skills. Students were interested in networks, where they can share their dreams and goals and get positive feedback on self-expression. Sharing lecture notes in student online communities had also gained popularity. Job and internship search platforms were analysed by many students and their priorities were mainly country-specific. In Finland, the priority was the Canadian platform www.monster.ca/, in France www.viadeo.com and in Spain www.Spain-internship.com. Many students still thought about their career options inside their present country of residence. Among general-purpose networks, Pinterest and Instagram had gained ground but analysis of their functionalities as networking tools was not detailed by students. The same applies to Twitter.

In 2014 - 2015 difference between students that were interested in online networking to find jobs in their own country and students interested in international career had become more clear. Some by invitation only networks such as the Professional Pilots' Rumor Network were discussed. There was some criticism of missing groups in LinkedIn about country-specific financial expertise and complaints that too many LinkedIn members use this platform as an advertising tool. The dots https://the-dots.com/ was promoted as "LinkedIn for creatives". Some overviews of networking experience pointed out that expanding contact network also means risks that some "friends" misuse your personal information. Students liked networks that link professional networking to some personal attraction driven Tinder features: "Main idea is that Meshly mixes up LinkedIn and Tinder". Some students preferred to use online media for local networking and for meeting new people at a physical location. Meetup was described as a good tool for this purpose.

In 2016 – 2017 Instagram and Pinterest were often described by students as their priorities but without detailed reasoning how these networks help business students. Discord was promoted as a strong community of online gamers. Online media support for attending local events was even more stressed by students than during earlier years. Examples were Resident Advisor and Brella. A user of www.happn.com stated: "Why should we go on dating websites when we meet so many new people every day, in real life?". Anonymous discussion forums about some locations were also promoted: "The fact that Jodel is a completely anonymous online community has solved that "problem". "Jodellers" are free to express any political, personal or sexual opinions." Angel List, Investly, Gust, Kickstarter, Funderbeam and Scandinavian Investment Network had higher popularity for students interested in start-up entrepreneurship than during earlier years. Some students that had co-creative entrepreneurial orientation saw value in www.efactor.com. The idea of this online platform was to use special algorithms that allowed members to connect with the right people, but this network is not operating anymore. Digg and Reddit were popular among students that complained about too much online information to process and were looking for advice from friends and the right categories to be engaged in more focused online knowledge sharing. Request for the wisdom of the crowd was expressed in a comment about www.reddit.com: "Subreddits … provide a platform where users can post questions basically about anything and other users provide the answer to how something works or is." Some Finnish students were pragmatic and preferred social media applications that bring together service providers and users at a service auction http://www.dooxe.fi.

French students were more interested to discuss cultural issues online in SensCritique. They also preferred to prove their skill to potential employers as freelancers in a project that they find in https://cremedelacreme.io/. French students were also interested to promote and receive environment-friendly action ideas at https://www.koom.org/. Students that preferred Facebook as their main online media stressed the role of Facebook hidden or secret groups that match their interests and bring together likeminded users. Facebook Messenger and other real-time chat applications had become popular.

In 2018 platforms that enable some integration of various online communication tools such as Slack had increasing popularity. There were however also critical comments: "Even though Slack has several good features, there can be distractions as well. Multiple conversations and all the alerts of the app may be a distraction and take your focus away from relevant issues." Jobs and careers continued to shape motivation for networking. French students preferred to use online tools (for instance https://www.jobteaser.com that bring together the major players in youth employment: companies, schools and universities, students and recent graduates. Among students from Nordic countries, more discussion is about using online media such as Young Entrepreneurs Council https://yec.co/ for independent entrepreneurship. https://shapr.co/ network was introduced as a tool to meet new people as the best way to find inspiration and new opportunities. This network suggests meeting each week at least one new person online. Student comment: "Sharp is Tinder for networking that evolves into long-term relationships".

5. Social media popularity change trends and business students' preferences for creating new networks

Comparison of periods from 2008 to 2018 shows that general-purpose social media has been popular during the whole decade, although Facebook has taken over the role of Orkut and during recent years Instagram and Facebook have gained more popularity. The main social media popularity change trends that should be taken into consideration in entrepreneurship education are summarized in table 1.

Table 1: Change trends of online networking priorities

Networking priorities of students 2008-2013	Networking priorities of students 2014-2018
Limited attention on visualization in online communication	Strong preference of online platforms, where visualization is the essential communication tool
Cybersecurity and trust in online communication was not a big issue	More attention on cybersecurity and trust-building in online networking
Choosing which general-purpose online network platform to use	Some focus on finding new business opportunities and new business ideas through specialized online networks for entrepreneurs
Online social media as a tool for networking with old friends	Online social media as a tool for finding partners and mentors for entrepreneurial self-development
Online networking as an alternative to socialization in physical space	Online networking platform as a tool to start co-operation in physical space

When comparing the online networking practices and priorities of the first six years and recent five years, the increasing preference of visualized communication is a clear trend, reflected in Instagram and Pinterest popularity. Entrepreneurship education can adjust to this trend by instructing students, how to use business model canvases and visualization tools that support design thinking when developing new venture ideas. Assignments to students in entrepreneurship courses can include using Google images for quick tracking of visuals that reflect competing solutions to business opportunities they have identified. Cybersecurity solutions are supported by information technology classes but trust-building in online teamwork and decisions what sensitive information to share in open innovation activities is an issue for such entrepreneurship education that has the ambition to support globally scalable start-ups and recruitment of talents from other countries.

Online knowledge sharing for finding new business opportunities, mentors and global talents for start-up teams has become a more important networking priority during recent years under the influence of developing start-up and business angel communities in Nordic and Baltic countries. Some platforms for finding mentors and business partners have been created by innovative teams that have used the learn start-up logic, where the pivot is normal practice if rapid scaling is not successful (Contigiani and Levinthal, 2019). It is important to monitor regularly which platforms have lost popularity and which newcomer create more value for networking.

During the whole decade internship and job search has been a popular way to use social media but there is a clear difference between students that are interested to find jobs at their country of residence and globally mobile young people interested to travel and experience new jobs at several locations. During the Business in virtual networks course, cross-border Helsinki-Tallinn online teams most often chose to develop networking ideas for internship and/or job search that considered some special features and needs of business students. Some ideas were focused on better use of contacts between university alumni and present students. In recent years opportunities of students to gain a deeper understanding of the real organizational culture of potential employers and sharing knowledge with students that have had earlier internship experience in these organizations have been important priorities in developing social media applications that support networking for internship and long-term employment. Team-based project work linked to offering jobs to these team members which have proved their skills during project work has been also a direction to develop new online networking tools that could create more internship and job options for students. Student teams have been usually enthusiastic in analysing student needs but solutions for engaging employers to use new social media applications have been weaker in prototypes created during the course.

Students experienced in sports have suggested linking online social media and location-based tools to enable more joint sports activities of students and other interested social media users that travel from Helsinki to Tallinn or from Tallinn to Helsinki and want to meet new people at sports grounds or during jogging. These prototypes have had relevant functionalities but there is a challenge that such competitions or joint training events can be also agreed between sports clubs without regular tracking online social media and paying monthly subscription fees.

In recent years students have proposed networking ideas for environment-friendly initiatives and related co-operation between young people and companies ready to act as clients or sponsors for these initiatives. In Estonia, the World Cleanup Day global network https://www.worldcleanupday.org/ has inspired young people to think about social entrepreneurship opportunities in this direction.

6. Conclusions

Priorities of business students as online social media users have changed during the recent decade both under the influence of online communication technologies and under the influence of globalization. Implications of online social media for entrepreneurial self-development practices depend on the work and mobility experience of students and their readiness to start a new venture already during their university studies. Students involved in Erasmus student exchange are often active social media users, but their priority is at first to nurture contacts with their old friends. They need more guidance to team up with new fellow students to start a new venture. That can lead to linking Erasmus mobility experience more to entrepreneurial self-development practices and to using most suitable online media for the co-creative cross-border entrepreneurial initiative after these students have returned to their home country.

Students that are already engaged in online networking linked to their music, art, sports, online gaming or travelling hobbies have good readiness to convert their networking experience to online social media use for entrepreneurship. To design a scalable new solution, such students may however already at the prototyping stage need other team members skilled in information technology and social media marketing.

In the entrepreneurial learning process, the role of social media will change depending on the stage of the entrepreneurial journey of a learner. At the stage of new business opportunity search, it is useful to be involved in online communities, where global social, economic and technological trends relevant for entrepreneurship are discussed. At the stage of developing the business idea, online mentoring may be considered. At the same time skills to create their personal online brand should be developed for further more active involvement in online communities, where additional talents for the business development team and network members able to validate the prototype at international markets can be found if the entrepreneur's vision assumes international business. Start-ups usually need co-operation with business angels that assumes trust creation among investors. The role of online networks is to create interest among a larger number of potential international investors.

Business schools need to use knowledge sharing between students that are rapid to find new online media applications and academic staff that has the competence to coach students how to act as responsible digital

citizens that are aware of social media risks and able to align social media use with their self-development efforts during different stages and crucial choices of their entrepreneurial journey.

Limitations of this qualitative research are related to the elective nature of the learning process that gave input for analysing online networking priorities of business students. The composition of study groups by nationalities was not exactly the same in the years under review.

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The Role of Cultural Competence in the Internationalization of SMEs Using e-Commerce

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Abstract: This study is exploratory and aims at examining the effect of cultural competence on the relationship between organizational culture and the international orientation of Small and Medium Enterprises (SMEs). Egyptian SMEs with an e-business platform are the target population of the research. It uses the international entrepreneurship theory and the theory of planned behaviour to conceptualize the framework of the study. The methodology used includes the use of primary data obtained through a self-administered questionnaire. It assesses the organizational culture based on the Competing Values Framework (CVF), identifies the cultural competence based on the International Profiler (TIP) survey that aims to assess the cultural competence of the managers of the SMEs and the international orientation of the SMEs in the sample. A total of 110 SME managers completed the self-administered questionnaire. The data collected is analysed through the SPSS statistical package using correlation, logistic regression, and structural equation modelling. The results are timely with the pandemic and the lock down imposed on many businesses; many will have to depend more and more on e-commerce in their operations. SMEs are specifically vulnerable, because of their limited financial resources. The findings show that the adhocracy organizational culture and the market organizational culture are antecedents of the cultural competence of the managers. The adhocracy culture is always developing and seeking to create new resources, the market culture is pursuing new market penetration and achieving more success. The cultural competence has a positive and significant effect on the international orientation of SMEs using e-commerce platforms and is proven to be mediating the relationship between organizational culture and international orientation. Therefore, the study emphasizes the importance of having an adequate organizational culture that nurtures and develops international orientation. This is the role of the owners and managers of the SMEs, to create and develop such a culture.

Keywords: cultural competence, SMEs, e-commerce, international orientation, organizational culture, Egypt

1. Introduction

International operations are increasingly becoming a requirement for the survival, competitiveness, and expansion of entrepreneurial ventures (Muzychenko, 2008). The inability of managers to understand a subsidiary's local culture and interact effectively with their counterparts overseas, rather than a lack of ability in technical aspects of their job, was a major factor in the failure of enterprises (Johnson, Lenartowicz, & Apud, 2006). Although many international business failures have been attributed to business practitioners' lack of cross-cultural competence (CC), the international business literature appears to lack a sufficient conceptualization and definition of the term 'CC,' instead focusing on the knowledge, skills, and attributes that appear to be its antecedents (Johnson et al., 2006).

Culture and competence are well-known topics; both are on the academic agenda and are frequently discussed in day-to-day organisational debates. However, the interactions and interdependence of these two concepts have yet to be studied (Fleury, 2008). Those are areas of organizational phenomena that might be complementary or even be contradictory. The aim of this study is to discuss the relationship between organizational culture, cultural competency and international orientation. Does organizational culture enhance or jeopardize the development of new competences? Is it possible for an organization to develop new competences while keeping its core values? This paper proposes an initial incursion into this debate, revisiting the concept of culture and cross checking it with the concept of cross-cultural competence.

2. Cultural competence

Cultural competence stems from cultural awareness, which originates from self-awareness. Self-awareness enables one to recognise one's own biases, prejudices, and judgments (Puckett, 2020). Many different terms have been used to define or discuss intercultural competence, including ethnic competence, cross-cultural competence, global competence, transcultural competence, cultural intelligence (CQ), multiculturalism, cultural responsiveness, and cultural humility. Some academics use more general terminology when discussing cultural

competence. Whatever terminology is used, it all refers to an understanding that people are unique; this enables each individual to collaborate more effectively with others (Puckett, 2020)

Cultural competence is the result of the collaborative work of several fields of study, including sociology, psychology, management, organisational behaviour, and anthropology. It is defined as the ability to work and communicate effectively and appropriately with people from culturally different backgrounds (Alizadeh & Chavan, 2016). Cross cultural adaptability is a similar term that describes intercultural competence and it refers to four skills; emotional resilience, flexibility, perceptual acuity and personal autonomy. Cultural awareness, cultural knowledge and cultural behaviour were considered as the most important elements of cultural competence in the majority of frameworks presented in the literature (Alizadeh & Chavan, 2016).

One measurement of cultural intelligence, which has attracted lots of attention and recognition by scholars, was the CQ (Cultural Quotient) (Van Dyne, et al., 2008). Other measurements for intercultural competence are the Sociocultural Adaptation Scale (SCAS) and the Cross Cultural Adaptability Inventory (CCAI), which are proposed by Ward and Kennedy in 1999 and by Kelley and Myers in 1993 respectively (Shi & Franklin, 2013). The first construct measures mainly the socio-cultural adaptation to unfamiliar cultures and the second measures psychological adjustment and the potential for cross cultural effectiveness (Spencer-Oatey & Franklin, 2010). Both measurements have been proven to be valid in various studies (Shi & Franklin, 2013).

The International Profiler (TIP) is a psychometric questionnaire based on a set of competencies that are classified as to enable those who possess them as able to become swiftly potent in unfamiliar cultural settings (Spencer-Oatey & Franklin, 2010). Therefore, this questionnaire presents a suited model to be used in assessing cultural competence. To support this statement, Spencer Oatey & Franklin (2009) continue to add that TIP aids managers to comprehend what they place emphasis on when working internationally. Moreover, it forms 'the basis for a structured exploration of an individual's international competency requirements' (Spencer Oatey & Franklin, 2009). A major strength of the questionnaire lies in its components that clearly relate to management in an international setting as managers truely experience it; this often leads to a high level of credibility in the eyes of the respondents (Spencer Oatey & Franklin, 2009).

The questionnaire is based on ten competencies derived from various fields which are broken down to subsets to reach a total of twenty two dimensions (Kammerer, 2006). The first set tackles openness and is divided to assess new thinking, welcoming strangers, and acceptance (Kammerer, 2006). The second set examines flexibility in terms of behaviour, judgement, and a willingess to learn new languages (Spencer Oatey & Franklin, 2009). The third set evaluates personal autonomy by viewing inner purpose and focus on goals (Kammerer, 2006). The fourth set titled emotional strength examines resilience, coping, and one's spirit for adventure (Spencer Oatey & Franklin, 2009). The fith set regarding perceptiveness looks at one's reflected awareness and attunedness (Kammerer, 2006). The sixth set judges the listening orientation by looking at the degree of active listening portrayed in the international manager's behaviour (Kammerer, 2006). The seventh set weighs up the degree of transparency in terms of clarity in communication and the exposure of intentions (Spencer Oatey & Franklin, 2009). The eighth set evaluates cultural knowledge in the light of information gathering and valuing differences (Kammerer, 2006). The ninth set looks at influencing through the international manager's ability to build rapport, the range of styles used, and senstivity to the context (Kammerer, 2006). The tenth set concerns synergy through creating new alternatives (Kammerer, 2006). The International Profiler report scores across a total of 22 dimensions.

3. Cultural competence and international orientation

Individual attitudes and the allocation of resources to international activities are referred to as international orientation (Sørensen & Madsen, 2012). When expanding into new markets, organisations with an international orientation can maintain a competitive advantage and be more willing to take risks (Martin & Javalgi, 2018). International orientation is measured through the scale developed by Sørensen and Madsen in 2012, which is used widely in previous research.

In these terms, Aharoni (2004) attempted to identify the underlying reasons for engagement in foreign activity in addition to how the firm manages this activity. According to Aharoni 'there is some strong force, some drastic experience, that triggers and pushes an organisation into this trip into the unknown (Hermannsdottir, 2008). Referring to what has been suggested by Aharoni, the explanation provided by the model describes the intention

to internationalise as the trigger or the push that moves an individual or organisation to consider the process. Moreover, Hermannsdottir (2008) continued to add that the model states that the most pivotal decision is taken when the first venture abroad is considered. Therefore, Aharoni suggests that the intention remains to be a critical stage in the internationalisation process.

To support the previous discussion, Hamel & Prahalad (1989) argue that a strategic intent to seek international expansion is the underpinning reason for success of a number of start-ups. Additionally, the founder's strategic intent to internationalise has been argued to play an influential role in the internationalisation process (Coeurderoy, et al., 2008). Moreover, research has also indicated that success in internationalisation relies on international capabilities, experience, and learning as previously mentioned in the behavioural models (Zahra, Sapienza, & Davidsson, 2006; Bell, McNaughton, Young, & Crick, 2003).

Even though cultural competence (the independent variable) is generally mentioned in several works, only a few studies focus on the terms' relationship with international orientation, the dependent variable (Mendenhall & Oddou, 2001; Caligiuri, 2000). However, there are several researches stating the link between cultural intelligence and internationalisation (Korzilius, et al., 2017). Cultural awareness/intelligence highly contributes to how individuals successfully behave in international markets (Tian & Borges, 2011), thus it is a skill/attribute that is increasingly significant within the internationalisation context (Ramsey, Leonel, & Monteiro, 2011). Research has suggested that individuals with a 'multicultural mindset' are better at adjusting their behaviours in different cultural setting, which generally can aid in the internationalisation process (Lee & Liao, 2015). Therefore, cultural competence with all its dimensions can be a push factor for internationalisation.

Hazarbassanova (2017) asserted that internet firms are prominent players in the international context. In addition, one of the most common entry modes in the internationalisation process of e-businesses is through exporting, as mentioned by Grochal-brejdak (2011). Therefore, it would be of interest to explore the relationship between cultural competence and internationalisation within the Egyptian context through e-businesses as it presents a new and facile method to internationalise – which is most applicable currently with the COVID19 implications – that deviates from the commonly expected processes.

4. Cultural competence and organization culture

The common culture of the majority of organisational members influences how the firm interacts with its internal and external environment in the pursuit of solutions to issues such as success and survival (Joseph & Kibera, 2019). The dominant leadership styles, communication, organisational processes, frameworks, and systems all contribute to the culture of a company. There are numerous definitions of organisational culture (Aktaş, Çiçek, & Kıyak, 2011). In these terms, organizational culture can be defined as the shared values, beliefs, and hidden assumptions of an organization's members. Such shared values serve as the foundation for communication and mutual understanding, and they influence employee behaviour through its two primary functions: internal integration and coordination (Naranjo-Valencia, Jiménez-Jiménez, & Sanz-Valle, 2016).

In other words, values and beliefs shape the structures and systems that are built within an organisation, as well as how people interact with one another. Structures and systems, on the other hand, influence organisational members' attitudes. Through the collective efforts of individual members of the organisation, organisational culture plays a primary role in modelling the firm's behaviour and performance (Joseph & Kibera, 2019). Thus, it is important to examine and evaluate the organizational culture to be able to understand and anticipate the attitudes and behaviours of its members.

Cameron and Quinn Flexibility (1999) introduced the Competing Values Framework (CVF) to reflect the evolution of an organisational culture. This model is one of the most widely used and influential frameworks in the field of organisational culture research (Naranjo-Valencia et al., 2016; Aktas et al., 2011). Cameron and Quinn (1999) use two dimensions (see Fig. 1) to describe four cultures: adhocracy, clan, market, and hierarchy: flexibility and discretion versus stability and control, and external emphasis versus internal focus and integration. They define four types of organisational cultures using these, as well as six organisational aspects dominant characteristics, organisational leadership, employee management, the organisational glue, strategic orientation, and performance criteria. The *adhocracy culture* places a premium on flexibility and transition, and it is centred on the outside world. It's most common in businesses that work in fast-paced environments as well as those aspiring to be industry leaders. Creativity, entrepreneurship, and taking risks are essential principles of an adhocracy

society. *Clan culture* emphasises flexibility as well, but it is internally based. Teamwork, employee engagement, and organisational responsibility to workers are all characteristics of clan culture firms. A *market culture* proclaims control and stability and is oriented toward the outside world. This culture's core values are goal achievement, consistency, and competitiveness. Finally*, a hierarchy culture* is control oriented as well, but it focuses on internal organisation. Its guiding principles are efficiency and strict adherence to norms, rules, and regulations (Naranjo-Valencia et al., 2016).

Figure 1: The Competing Value Framework (CVF)

Organizations do not have one specific type of culture; but all types are present in every organization, but with varying degrees. Based on the degree of presence of each type in any one given entity, we can conclude the dominant culture of this organization. It is expected that a market culture, that is geared towards the outside world and an adhocracy culture which also focuses on the outside world, would be antecedents of cultural competence, which enhances and supports the effective collaboration with other cultures.

Therefore, the following hypothesis is proposed:

> *H1: There is a positive and significant relationship between the market culture and cultural competence.*
>
> *H2: There is a positive and significant relationship between the adhocracy culture and cultural competence.*

5. The theoretical framework

The theory of Planned Behaviour (TPB) is an extension of the Theory of Reasoned Action (TRA) and is considered one of the most popular theories in social sciences (Ajzen, 1991). It proposes the three constructs used to predict an intention to use a certain innovation: attitude, subjective norms, and perceived behavioural control. Attitude refers to a person's (favourable/unfavourable) evaluation of the behaviour; subjective norms form the social pressure to perform the target behaviour; and perceived behavioural control is the extent to which a person feels able to enact the behaviour (Idris, et al., 2017). The theory of planned behaviour fulfils the goal of explaining human behaviour, not merely predicting it, by studying attitudes, subjective norms, and perceived behavioural control, to determine both intentions and actions (Ajzen, 1991). It has been applied empirically to explain technological adoption, such as e-commerce adoption in Botswana (Uzoka et. al, 2007) where it was found out that attitude seems to outweigh the subjective norm and perceived behavioural control. TPB was also used to explain the intentions and behaviours of SME's regarding social media adoption (McLaughlin & Stephens, 2015), by studying the owner/manager decision-making process.

The Theory of Entrepreneurship (Mishra & Zacahry, 2015) identifies the two stages of the entrepreneurial process; the first is initiated through the entrepreneurial intention, where the entrepreneur identifies an external opportunity, matches the entrepreneurial resources at hand with the opportunity to effectuate an entrepreneurial competence; acquires the needed resources, and aims at creating sustained value by appropriating the entrepreneurial reward (Mishra & Zacahry, 2015). This allows the entrepreneur to move to the second stage of venture monetization, where the entrepreneur will aim to sustain value creation and appropriate the entrepreneurial reward (Mishra & Zacahry, 2015). The international entrepreneurship theory is an extension of the theory of entrepreneurship and focuses on the antecedents of cross-border entrepreneurship putting forward the pro-active role of the entrepreneur in terms of individual-specific characteristics that have been found to positively influence internationalization (Lin, 2012). These include demographic factors, such as age (Westhead, 1995) and the level of education (Simpson and Kujawa, 1974),

factors relating to individual's knowledge and experience such as the entrepreneurs' or top managements' international business experience and knowledge of foreign institutions (such as knowledge of foreign laws, norms, standards and languages) (Oviatt and McDougall, 1995; Reuber and Fischer, 1997), sources of sustained competitive advantage (Ruzzier, et al., 2006) and individual skills and attributes like cultural intelligence (Fakhreldin, 2018).

Based on the above, the following figure (1) shows the theoretical framework adopted in the study, which is based on both the TPB and the International Entrepreneurship theory. The latter proposes that variables in the environment of the entrepreneur determine the individual skills and attributes like cultural competence. These variables in the internal environment of the entrepreneur are in this case the one or several dominant organizational cultures. The TPB suggests that the attribute of cultural competence will lead to having an international orientation, which will push for expanding the operation of the enterprise and pursue international operations. The following hypothesis is also proposed.

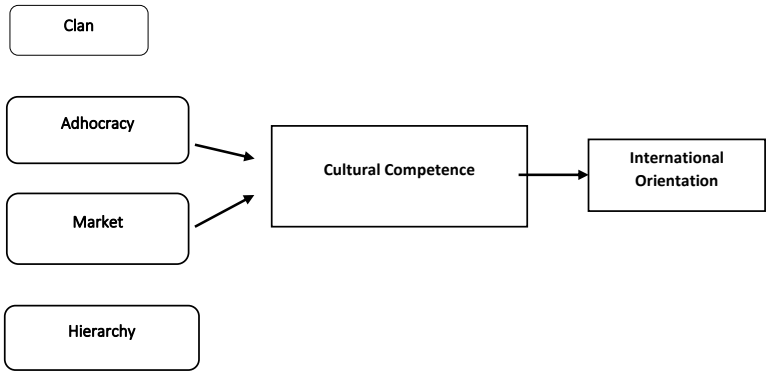

Figure 2: Theoretical framework

Based on the theoretical framework the following hypothesis is proposed:

> *H3: Cultural competence positively mediates the relationship between the market and the adhocracy culture and the international orientation of the managers of the SMEs.*

6. Methodology

6.1 Survey instrument

The variables investigated in this study were measured on a five-point Likert scale with anchors ranging from very low (1) to very high (5) for the independent variables of cultural competency, and organization culture. The respondents (SME senior employees) were asked to rate their companies' current practices in relation to organizational culture practices and their cultural competencies practices. The organisation cultural four types were identified in the current study using the CVF-based organisation culture scale, while the cultural competencies variable was adapted from previous studies used for all the constructs in the current study. Cultural competency is measured from TIP (Spencer-Oatey & Franklin, 2010). For the dependent variable, international orientation, the Likert-type scale with anchors ranging from very low (1) to very high (5) was also used. The items used for assessing the international orientation were adapted from the international performance measured via items tapping the extent of SMEs' satisfaction of their performance abroad adopted from Zou, Taylor, and Osland (1998) with higher scores implying greater satisfaction.

6.2 Data collection and sampling

A questionnaire was created to collect the necessary data for the study. Prior to collecting questionnaires from SMEs senior employees, a pilot test was conducted using in-depth interviews with them to increase the content validity of the questionnaire measurements. The interview feedback was used to revise the final questionnaire before it was used with other respondents. The final questionnaire was used in face-to-face interviews with senior executives from Egyptian SMEs. Only one senior employee from each SME was asked to participate in the study. The senior employees of the SMEs were surveyed because it is assumed that they are the most knowledgeable about the subject matter under investigation. A total of 110 participants were chosen using convenience sampling combined with the snowballing sampling technique.

The final sample included 9 percent owners, 36 percent managers, and 54 percent senior employees as respondents. The majority of respondents were either managers or senior employees in their respective companies. In terms of the SMEs profile, 99 percent have a company website, 65 percent deal with foreign companies, and 95 percent are thinking about expanding internationally. The majority of these were in Cairo and the others were distributed on different governorates across Egypt. What these enterprises had in common was that they all were engaged in e-commerce, i.e. they used the internet to conduct commercial transactions of buying and selling their products and services. E-commerce serves as a lifeline for small and medium-sized businesses that are having difficulty entering the market in today's globalizing environment (Sarac and Batman, 2020). This justifies the authors' interest in researching this topic.

6.3 Statistical analysis

Reliability and validity

Internal consistency between the constructs' indicators was assessed through Cronbach's alpha and all showed a high level of consistency alpha ranging between 0.797 and 0.930 as presented in table 1, same for CR all constructs' CR were exceeding 0.7 (ranging between 0.76 & 0.93) assuring reliability. Confirmatory factor analysis was used to assess convergent validity through using "lavaan" package available in R-program. WLSM estimation method was used as the data was categorical (Likert scale). It was confirmed according to the statistical results shown in table 1 that includes the standardized factor loading of constructs indicators (ranging between 0.50 and 0.88). AVE values showed high level of convergent validity as well with values exceeding or equal to 0.40. Additionally, corrected item total correlations all were above 0.4 confirming convergent validity too. Finally, divergent validity was satisfied through having AVE>ASV in all constructs (Rebelo-Pinto et al., 2014).

Table 1: Validity and reliability measurements

Construct	AVE	CR
Clan Organization Culture – Construct (Cronbach's alpha = 0.798)	0.4	0.79
Adhocracy Organization Culture – Construct (Cronbach's alpha = 0.799)	0.40	0.80
Market Organization Culture – Construct (Cronbach's alpha = 0.788)	0.4	0.79
Hierarchy Organization Culture – Construct (Cronbach's alpha = 0.772)	0.4	0.76

CR: Construct Reliability**, AVE:** Average Variance Extracted

Goodness of fit

The model fit indices indicate that the data were well fitted with a significant χ^2 value. It is always recommended to depend on normed χ^2 value, which is calculated by dividing χ^2 value with its degrees of freedom, given a value of 2.11 meeting the acceptable range as χ^2 measurement is sensitive to sample size. Moreover, CFI revealed a value greater than their cut off point 0.90 or higher (Hu and Bentler, 1999; Hooper et al. 2008) with values 0.943. However, TLI did exceed the cut-off value but this may be due to not having a reasonably large sample size and the same applies to RMSEA index as well. SRMR satisfied the criteria of having a value less than **0.09.**

***Structural equation modelling* (SEM)**

SEM was used as a statistical analysis method to assess the indirect effects of organisational culture on international orientation. The increasing complexity of the models used in the literature to assess international orientation may explain the method's popularity. This method estimates the measurement errors and structural relations of the model at the same time, and it allows for the estimation of multiple and interrelated dependence relationships between unobserved constructs, i.e., constructs can be both dependent and independent variables (Hair, et al. 1998). Another issue for the SEM application is estimating sample size. So far, the estimation of sample size is flexible, and users can refer to the recommendations of several authors. While some studies clearly reported the sample size, none of them provided a theoretical justification for the sample size. In the mode, some researchers recommend a sample size of 100–200 (Lacobucci, 2010; Tabachnick and Fidell, 2001).

7. Findings and discussion

The Pearson correlation results between the model's constructs are shown in Table 2 below. It provides information about the relationship's direction and strength.

Table 2: Pearson correlation table between constructs

	1	**2**	**3**	**4**	**5**	**6**
Adhocracy	1	.842**	.774**	.836**	.355**	.665**
Clan	.842**	1	.654**	.709**	.313**	.581**
Hierarchy	.774**	.654**	1	.826**	.279**	.550**
Market	.836**	.709**	.826**	1	.278**	.655**
International Orientation	.355**	.313**	.279**	.278**	1	.244*
Cultural Competence	.665**	.581**	.550**	.655**	.244*	1
***. Correlation is significant at the 0.01 level (2-tailed).*						
**. Correlation is significant at the 0.05 level (2-tailed).*						

Table 3 below shows that the constructs of the four types of organizational culture; the adhocracy culture and the market culture positively and significantly affected the cultural competence with coefficients 0.36 and 0.375, respectively. The clan culture and the hierarchy culture have no effect on the cultural competence variable. Thus, both H1 and H2 are supported. There is a positive and significant relationship between the market culture and cultural competency. There is also a positive and significant relationship between the adhocracy culture and cultural competency.

The second model measures the cultural competence as a mediating variable between the organisational culture (clan, adhocracy, market and hierarchy) and the international orientation; it shows a significant impact on the international orientation of the organization, with a p-value < 0.01.

Table 3: Estimates of the simultaneous path analysis model

Dependent Variable	**Independent Variable**	**Estimate**	**Standard Error**	**P-value**
Culture Competence	Clan	0.064	0.128	0.615
	Adhocracy	0.36*	0.168	0.032
	Market	0.375*	0.146	0.01
	Hierarchy	-0.081	0.127	0.525
International Orientation	Culture Competence	0.244**	0.092	0.008

The findings confirm that the cultural competence is positively mediating the relationship between the market culture and international orientation. It is also positively and significantly mediating the relationship between the adhocracy culture and the international orientation. Thus, H3 is supported.

The current study promotes that the dominance of two organizational cultures, specifically the adhocracy and market culture, contribute significantly to the cultural competence of the surveyed staff; this in turn has a positive and significant effect on the international orientation level of the managers and consequently the SME. Thus, the organization culture that places a premium on external flexibility, innovation, creativity, entrepreneurship, transition and risk taking is associated with the managers'/employees' intention to expand internationally. Much of the previous research claims that the cultural strength will have a positive direct effect on effectiveness as highlighted by Polychroniou and Trivellas (2017). Thus, the current study provides supporting empirical evidence that shows that there is a mediation effect of cultural competence on the relationship between two types of the organization culture and the international orientation level.

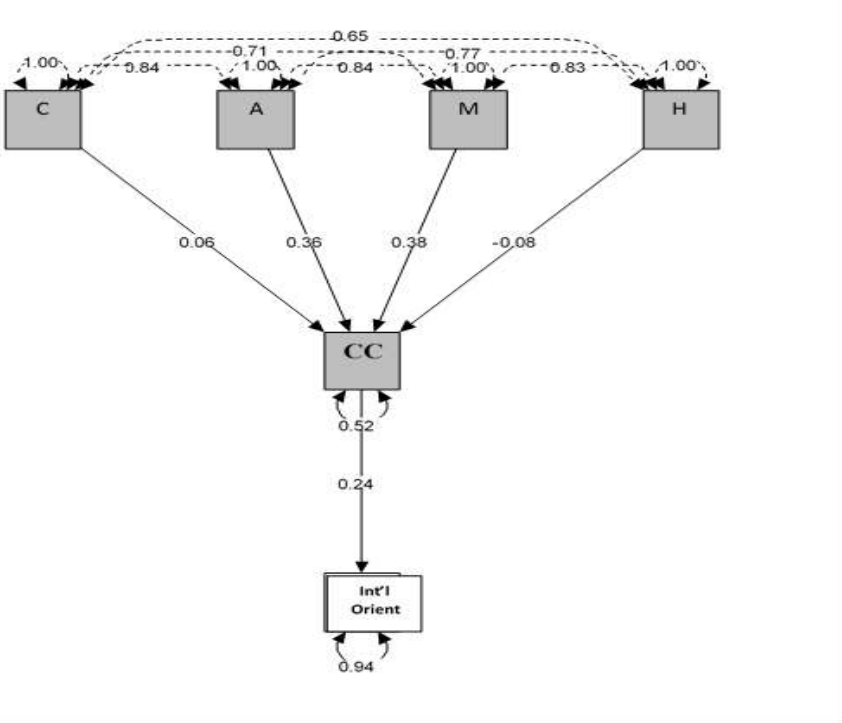

Figure 3: Path diagram of the path analysis model

8. Conclusion

This study is built on the theory of Planned Behaviour (TPB) and the theory of international entrepreneurship and suggests that the organizational culture affects the international orientation of SMEs through affecting the cultural competence level of the employees. Specific organizational cultures – the adhocracy culture and the market culture – can be considered antecedents of cultural competence, which will lead to potential internationalization of these enterprises. The appropriate organizational culture will produce and enhance the existence of culturally competent managers and employees. This is turn will make the SME more inclined towards internationalization and considering foreign expansion and communication. Thus, SMEs should try and develop market and adhocracy cultures, as these nurture the cultural awareness, knowledge and behaviour that does have a positive impact on the international orientation of the SMEs. Accordingly, the findings of the current study will support the Egyptian SMEs to enhance their performance in the international market by providing tools and recommendations to Egyptian domestic SMEs to consider expanding and operating with entities and markets abroad.

9. Limitations

Given that the field research was cross-sectional and was also conducted only in Egypt, our findings have some limitations that prevent conclusions from being generalised.

10. Future Research

Future research should examine other countries in the MENA region and in Africa. More similar studies are needed in developing countries. It is also recommended that future researchers investigate the effect of organizational culture on other performance and growth measures. Comparisons of SMEs in developed and developing countries will lead to reaching more generalizable conclusions.

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Startup Exits by Acquisition: A Cross Industry Analysis of Speed and Funding

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Abstract. Being acquired by a larger company represents the final step in a startup life cycle and is often the ultimate objective of both founders and equity investors. In fact, the occurrence of an acquisition allows shareholders to transfer their equity stake to the acquiring company and thus realize a return on their initial investment, hopefully resulting in a capital gain. From an investor's point of view, two important elements to estimate are the time needed to take a company to an exit and the capital it will require to reach that result. These two factors are related to the sector in which the venture operates. Since acquisitions represent the most frequent case of exit, this paper focuses on their analysis. A sample from Crunchbase with more than 17,000 U.S.-based tech-startups founded after the year 2000 and acquired before 2021 was analysed. Starting from the original 744 categories used by Crunchbase for company classification, 64 sectors were identified through a clustering process. For each sector, the following elements were calculated: the number of acquired companies, the average number of months it takes for companies to be acquired as well as the average amount of capital raised before their acquisition. By combining these analyses, it was then possible to create a matrix in which each sector has been positioned within four quadrants, considering the variables "acquisition speed" and "required capital". Considering also the number of companies in each sector, the weight of each sector in terms of investments can be estimated. On the other hand, more than 10,000 acquiring companies involved in the considered exits were also analysed, highlighting that 74% of them just made one single acquisition. Top 15 acquirers were also identified and their behaviour in terms of speed of acquisition and funding raised by target companies was then investigated.

Keywords: startup, acquisition, exit, investment, venture capital, Crunchbase

1. Introduction

When considering an entrepreneurial project for funding, equity investors (i.e., venture capitalists and angel investors) consider a set of assessment criteria in order to minimize the risk of the investment (Ferrati and Muffatto, 2021). One of the elements considered is the potential for a company to make an exit in the future (Mason and Botelho, 2016). In fact, the occurrence of an exit allows investors to transfer their equity stake and hopefully realize a capital gain. This logic also applies to the company's founders, whose ultimate goal is often to make an exit in order to liquidate their stake and make a profit (Wennberg and DeTienne, 2014). From a purely financial perspective, the occurrence of an exit event is to take into account from the earliest years of the company life cycle (Cotei and Farhat, 2018).

Startups can make an exit mainly in two ways: being acquired by a larger company (M&A) or through an Initial Public Offering (IPO).

While there are two paths to making an exit, in practice data show that M&As are by far the most common one. According to the National Venture Capital Association, on data collected from 2013 to 2019 out of 10,708 U.S.-based VC-backed startups that made an exit, 92% of the cases were M&As (NVCA, 2020).

Considering these figures, this paper focuses on the analysis of exits in the form of acquisitions only. The topic is investigated using a wide perspective, based on the analysis of large amount of data. Specifically, the phenomenon of startup acquisitions has been investigated by considering three factors closely related to each other: the sector in which companies operate, the time required to be acquired and the amount of investment raised before an exit occurs.

The study was carried out by considering sectors as the unit of analysis in order to provide useful statistics for comparing different types of business. The industry in which a company operates strongly influences its growth dynamics as well as its ability to produce significant multiples for investors (Metrick and Yasuda, 2011). In fact, venture capitalists invest in highly innovative, technology-based sectors capable of producing high growth rates, typically ICT and healthcare. However, this macro classification is not sufficient to significantly define the actual

activity of a company. In this paper a detailed classification of the analysed companies has been considered, in order to have a precise image of the various areas of business.

When analysing acquisitions, an important element to consider is definitely the time required (Pisoni and Onetti, 2018). In fact, the specific characteristics of each sector strongly influence the time it takes for a new startup to eventually make an exit. This is evident when comparing, for example, a mobile app company with one operating in the biotech industry. While the former can develop a final product even within a few months, the latter must be compliant with regulations that impose a lengthy product testing process.

Then, different sectors require significantly different amounts of investment in order to drive companies' business development. Regardless of capital requirements, some sectors are more attractive to investors than others, depending on the potential return on investment they can generate.

Based on these observations, this study aimed to analyse the acquisitions of startup companies in several high-tech industries, considering the time for acquisitions and the amount of raised financial capital. The objective is to create a comprehensive map of different sectors able to support both the decision-making process of equity investors and the evaluation of the entrepreneurial opportunity by startup founders. In order to provide insights on the other side of the board as well, an analysis of the top companies by number of acquisitions was also conducted.

The analysis was performed using data from Crunchbase, one of the most valuable databases collecting information on technology-driven entrepreneurship (Ferrati and Muffatto, 2020). A total of 17,213 acquired companies in 64 different tech-industries were analysed.

This paper is organized as follows. Section 2 describes in detail the data processing activity performed on the Crunchbase datasets, paying specific attention to how the considered sectors were classified. Section 3 provides an analysis of the acquired startups, revealing statistics on exits in different sectors, in terms of timing and funding. On the other hand, Section 4 analyses the behaviour of large acquiring companies and profiles the top 15 firms by number of acquisitions. Section 5 comprehensively summarizes the results obtained in the form of two matrices in which the different sectors, and then acquiring companies, are positioned within four quadrants according to the dimensions of exit's speed and raised capital. Finally, section 6 presents the conclusions and suggests some opportunities for future research.

2. Data processing

The data analysed was retrieved from Crunchbase on February 5, 2021. Overall, the Crunchbase database is organized into seventeen .csv individual files whose entities are related to each other by a system of unique identification keys (Ferrati and Muffatto, 2020). Specifically, the following datasets were considered in this study: *Organizations*, *Category groups*, *Funding rounds* and *Acquisitions*. The *Organizations* dataset provides information on private or public companies, financial organizations as well as schools and universities. The *Category groups* table provides a reference on the companies' classification system adopted by Crunchbase. The *Funding rounds* file presents data about every single investment collected by each company over its life cycle. The *Acquisitions* dataset, on the other hand, gives information on eventual exits made by the companies. In total, the extracted database contained the details of 1,260,649 organizations, 375,377 funding rounds and 111,778 acquisitions.

Starting with the raw data, an initial data processing activity was performed aimed at cleaning the data, merging the datasets, and then obtaining the final sample for the analysis. All operations were performed using Python and can be summarized as follows.

Considering the Organizations dataset, the records have been gradually filtered keeping only companies (1,188,682), based in the United States (422,552) and founded after the year 2000 (225,165). The choice to consider only companies based in the U.S. was made to refer to the same entrepreneurial ecosystem and so obtain a consistent sample. On the other hand, taking into account only companies founded after the year 2000 helped avoid the effects of the dot-com bubble. Subsequently, in accordance with the scope of this study, only companies that made an exit were considered (22,744). In fact, for each company, Crunchbase provides a so called "status" variable that defines whether a company is currently still *operating*, *closed*, or made an exit

(*acquired* or *IPO*). The number of acquired and IPO companies was 20,422 and 2,322 respectively. Since companies that have made an exit in the form of an acquisition were 90% of the cases, it was decided to focus specifically only on these instances. It is worth noting that the distribution between acquisitions and IPO in Crunchbase is actually consistent with that reported by industry studies (NVCA, 2020).

To this point the information of the *Organizations* dataset has been merged with those of the *Acquisitions* dataset. Specifically, within the *Acquisitions* dataset, the columns relating to the date of the event, and the information of the acquiring company (name and location) were considered. After merging the two datasets, it emerged that some companies had been acquired multiple times over their life cycle. In order to properly analyze these cases, only data from the first (i.e. oldest) acquisition were considered. In addition, for some companies, the date of their acquisition was inconsistent, being prior to their foundation. These cases were dropped from the sample resulting in 20,239 remaining companies. By knowing the date of foundation and the date of acquisition of each company, it was then possible to determine the lifespan (in number of months) of each venture.

Funding information was then integrated by merging the *Funding rounds* dataset. Specifically, the columns relating to the date of the funding round and the amount of the investment (in USD) were considered. At this stage, only the rounds made by the companies in the sample were considered, and the investments that occurred after the date of acquisition were excluded. As it emerged that for some rounds the information regarding the funding amount was not available, the companies that had not declared the amount of all their rounds were excluded, resulting in a final sample of 17,213 companies. The companies that instead had declared not to have collected any round have been however maintained in the dataset. Given the information on individual investment rounds, both the number and total value of investments raised prior to acquisition were calculated for each company.

Once the integration of information about the lifecycle of each company and the capital collected was accomplished, the sectors in which the companies operate were considered. To allow users to quickly search for companies in specific business areas, the *Organizations* dataset provides two variables ("category list" and "category group list") to classify the type of activity carried out by each venture. Specifically, organizations are labelled using 744 unique categories and 47 macro groups of categories. Categories and category groups are related to each other by a one-to-many relationship so that the same category can be associated with more than one category group. For example, the category "music streaming" is associated with three different category groups: "internet services", "media and entertainment" and "music and audio". The *Category groups* dataset details the rationale used to associate each category with one or more category groups. In order to review the classification methodology used by Crunchbase and increase the level of detail in the classification system, the 744 existing categories were reclassified into 64 main-sectors. Unlike Crunchbase, each category has been associated with one and only one sector, considering the dominant one on a case-by-case basis. According to the new classification, for example, the category "music streaming" was thus uniquely associated with the "media - music and audio" sector. Figure 1 compares Crunchbase's 47 category groups with the 64 sectors that emerged from the clustering process. It can be seen that some sectors have been clustered according to a two-level hierarchy. The "Media" macro sector, for example, has been considered in its various forms (i.e., "Media - contents management", "Media - digital media", "Media – entertainment", "Media - music and audio", "Media – photography", "Media – publishing", "Media - social media", "Media – video"). This operation makes it possible to carry out a detailed analysis (e.g., on the "Music and audio" sector) but also an analysis of the entire "Media" sector, considering all its various forms together.

After completing the clustering of categories, each company was associated with one or more sectors, starting from the categories declared in the "category list" variable. For this purpose, 64 boolean variables were created, each with the name of a sector, having a value equal to one if the company was active in that business. This operation made it possible to record all the activities carried out and to achieve a good trade-off in the degree of detail as well. It is important to note that, since companies in Crunchbase can be labelled with more than one category, then there can be multiple boolean sector-values equal to one for the same company. This means that in the following analyses, some companies may be counted in more than one sector. However, the occurrences of this one-to-many relationships were partially mitigated by associating each category with one and only one sector.

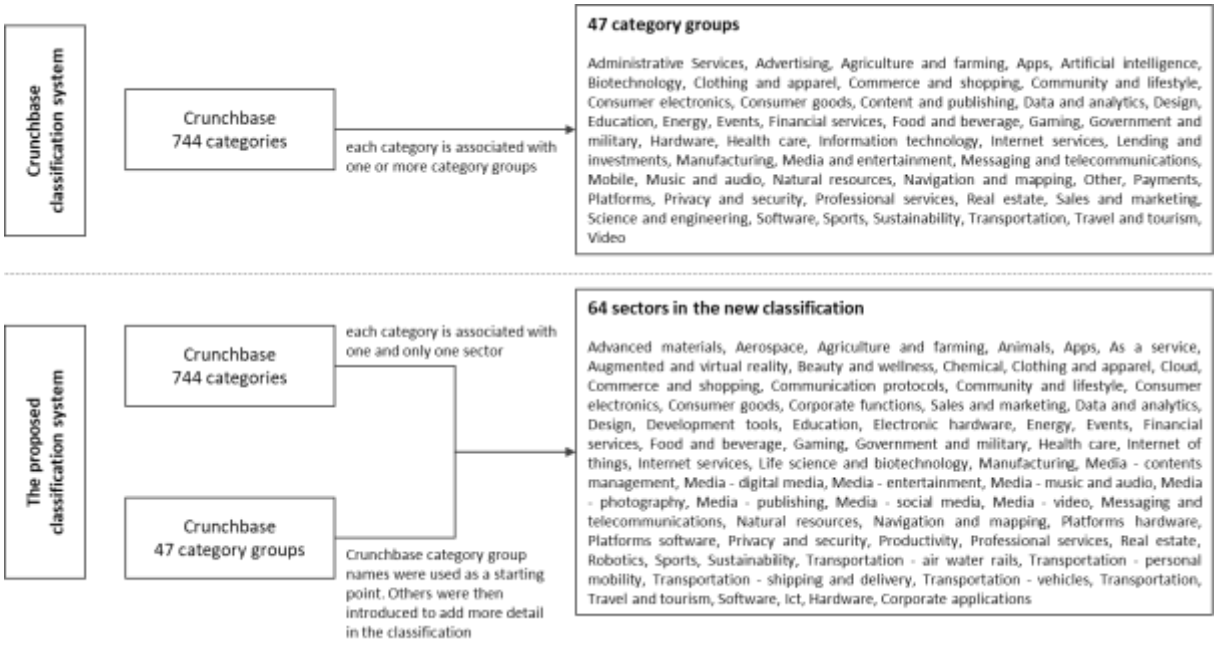

Figure 1: Comparison of the category groups used by Crunchbase to classify business activities and the proposed new classification system

3. Acquired startup companies

Considering the obtained sample of 17,213 acquired companies, a statistical analysis was performed for each of the 64 identified sectors. Specifically, for each sector, the associated companies were considered and the following elements were investigated: the distribution of companies among sectors, the duration of their life cycle (from foundation to acquisition) and the investments amount raised prior to the date of the acquisition. To provide insight into the characteristics of each sector, both the company lifespan and the raised investments were analysed by computing the mean, standard deviation, median, minimum and maximum. Considering the distribution of companies across sectors, the top five categories by number of companies are *software* (25.63%), *ICT* (14.82%), *healtcare* (14.67%), *sales and marketing* (12.28%) and *consumer electronics* (10.75%). All other categories were declared by less than 10% of companies. With the exception of the first five sectors, all other companies were therefore very well distributed among the different sectors. In fact, although they have been reported here for consistency, the *software* and *ICT* categories are too general to be able to describe the activity carried out by individual businesses accurately enough. Many of the companies in Crunchbase are in fact technology-based startups, actually develop software applications and that makes the *software* and *ICT* categories a catch-all class. Most often, companies declare the *software* category as their macro area, but also add other more specific sectors in which their software is actually used e.g., *financial services*. Therefore, these wide sectors should be looked at by considering also how the specific activities are present in other categories.

Still considering the distribution of companies across sectors, it should be remembered that one or more sectors can be associated to the same company. Thus, adding up the number of ventures in the individual sectors results in a value greater than the total number of companies in the sample (i.e., 17.213). In the following figures, the number of companies on which statistics have been calculated is plotted with a solid line, to make clear the soundness of the results on every category. For categories with fewer than 100 companies, the bars were coloured white. Sectors are identified by numbers as then reported in Table 1. One of the elements considered by investors in their decision making but also by entrepreneurs, both at the time of founding the company and along the fundraising process, is the time it will take to bring the company to an exit, specifically in the form of an acquisition. In fact, it would be desirable for the company to reach an exit in the shortest possible time, always considering the achievement of a valuation capable of producing an adequate multiplier on the initial investment. The speed of an exit can depend on many factors specific to the company itself (e.g., speed of product/service development, speed of business development, speed of scaling the market) but also often depends on factors that are embedded in the industry in which the company operates. Figure 2 reports the average number of months it takes for companies in each sector to be acquired. Regardless of industry, the average time it takes for a startup in the sample to be acquired is nearly 8 years (95 months). Among the below-

average and therefore faster sectors are, for example apps (65.6 months), media - social media (68.8 months), navigation and mapping (72.4 months), clothing and apparel (75.5 months), media - music and audio (75.9 months) and gaming (75.9 months). Among the sectors far above average and therefore slower, there are instead healthcare (103.2 months), corporate functions (103.4 months), financial services (105.0 months), manufacturing (105.2 months), government and military (107.1 months), professional services (110.8 months) and sustainability (113.1 months). Another important element considered by both investors and entrepreneurs in their planning stage is the amount of investment that will be raised over time before the business is acquired. Figure 3 reports the average amount of capital raised by the companies in each sector before their acquisition. Considering all 17,213 companies, regardless of the industry, the total amount of investments in the companies that have been acquired is, on average, equal to 9,416,931 USD. Top sectors by amount of raised capital include life science and biotechnology (34,3 MUSD), electronic hardware (29.3 MUSD), communication protocols (29.0 MUSD), cloud (21.5 MUSD), natural resources (18.3 MUSD) and healthcare (18.1 MUSD). On the other hand, among the areas where startups are able to raise the least amount of funding are real estate (3.6 MUSD), events (3.5 MUSD), food and beverage (2.7 MUSD) and consumer goods (2.3 MUSD).

Table 1 provides the mean and standard deviation of the companies' lifetime, as well as the total raised funding amount for each sector. All sectors are given in alphabetical order and are described by their name and a serial number, which is also used in the following figures as a synthetic identifier.

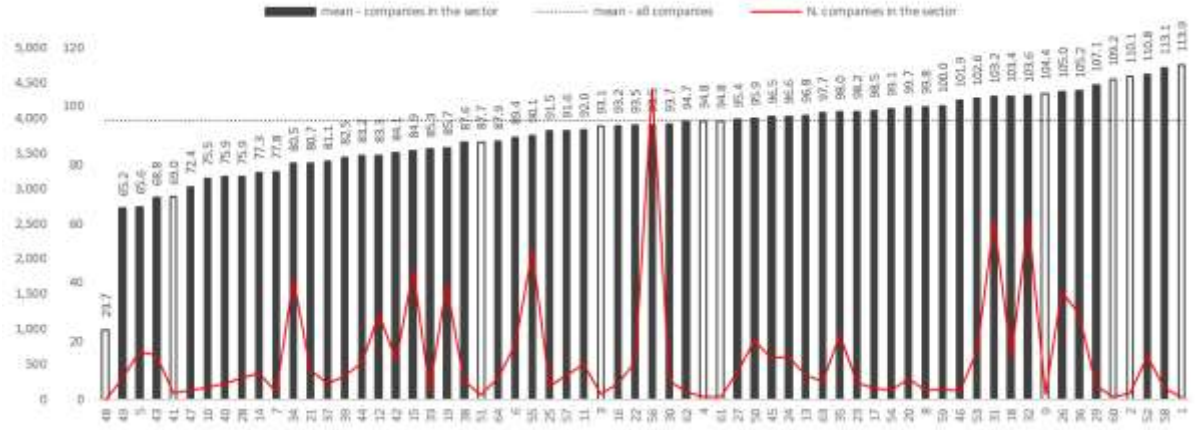

Figure 2: Average number of months for companies in each sector prior to acquisition

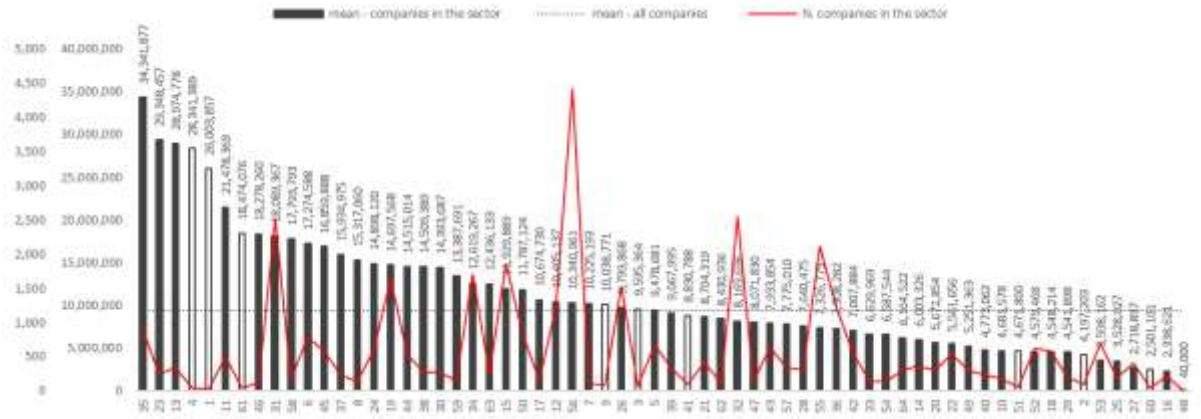

Figure 3: Average total funding amount raised by the companies in each sector prior to acquisition (in USD)

Table 1: Distribution of the companies in each sector and statistics related to their lifetime and investments

Sector (reference number and name)	Number of companies		Lifetime (in months)		Total funding amount (in USD)	
	N	%	Mean	Sd	Mean	Sd
01 - advanced materials	35	0.20%	113.9	48.2	26,003,857	39,560,231
02 - aerospace	98	0.57%	110.1	62.3	4,197,203	17,321,936
03 - agriculture and farming	74	0.43%	93.1	57.3	9,595,364	27,329,885

Sector (reference number and name)	Number of companies		Lifetime (in months)		Total funding amount (in USD)	
	N	%	Mean	Sd	Mean	Sd
04 - animals	44	0.26%	94.8	50.7	28,341,389	120,859,395
05 - apps	681	3.96%	65.6	44.5	9,478,681	44,625,416
06 - as a service	787	4.57%	89.4	52.6	17,274,588	70,542,909
07 - augmented and virtual reality	105	0.61%	77.8	56.6	10,225,193	25,680,924
08 - beauty and wellness	137	0.80%	99.8	52.2	15,317,060	43,243,451
09 - chemical	83	0.48%	104.4	54.2	10,038,771	46,038,108
10 - clothing and apparel	176	1.02%	75.5	52.4	4,681,578	16,953,634
11 - cloud	503	2.92%	92.0	52.7	21,478,369	84,558,829
12 - commerce and shopping	1,223	7.11%	83.3	52.5	10,405,137	51,441,650
13 - communication protocols	344	2.00%	96.8	54.0	28,974,778	84,650,669
14 - community and lifestyle	371	2.16%	77.3	51.0	6,003,326	27,032,781
15 - consumer electronics	1,851	10.75%	84.9	53.5	11,929,889	30,833,541
16 - consumer goods	222	1.29%	93.2	58.7	2,338,621	10,753,683
17 - corporate applications	156	0.91%	98.5	55.7	10,674,730	34,196,185
18 - corporate functions	588	3.42%	103.4	58.5	4,548,214	16,374,889
19 - data and analytics	1,642	9.54%	85.7	50.7	14,697,568	56,613,043
20 - design	300	1.74%	99.7	56.8	5,672,854	21,017,919
21 - development tools	415	2.41%	80.7	51.2	8,704,319	25,063,145
22 - education	543	3.15%	93.5	56.8	5,561,656	25,633,334
23 - electronic hardware	248	1.44%	98.2	51.3	29,348,457	48,295,406
24 - energy	607	3.53%	96.6	53.7	14,898,120	74,491,993
25 - events	189	1.10%	91.5	57.4	3,528,027	12,668,862
26 - financial services	1,532	8.90%	105.0	58.2	9,799,868	79,246,568
27 - food and beverage	409	2.38%	95.4	53.9	2,718,897	12,173,303
28 - gaming	311	1.81%	75.9	49.0	7,640,475	28,242,222
29 - government and military	198	1.15%	107.1	54.2	4,541,898	15,767,760
30 - hardware	268	1.56%	93.7	54.6	14,393,687	28,588,516
31 - health care	2,525	14.67%	103.2	54.5	18,089,367	65,794,634
32 - ict	2,551	14.82%	103.6	58.7	8,169,696	33,757,288
33 - internet of things	133	0.77%	85.3	51.1	6,629,969	16,549,538
34 - internet services	1,713	9.95%	80.5	51.6	12,619,267	81,986,382
35 - life science and biotechnology	923	5.36%	98.0	53.0	34,341,877	92,611,602
36 - manufacturing	1,225	7.12%	105.2	56.4	7,308,282	26,599,023
37 - media contents management	232	1.35%	81.1	46.5	15,934,975	72,667,485
38 - media digital media	269	1.56%	87.6	50.1	14,509,389	72,223,654
39 - media entertainment	342	1.99%	82.5	52.3	9,067,995	59,357,844
40 - media music and audio	234	1.36%	75.9	50.2	4,773,062	13,137,739
41 - media photography	96	0.56%	69.0	52.8	8,830,788	29,935,112
42 - media publishing	550	3.20%	84.1	52.4	7,007,884	45,261,264
43 - media social media	636	3.69%	68.8	45.0	7,933,854	25,434,271
44 - media video	528	3.07%	83.2	50.1	14,515,014	66,740,923
45 - messaging and telecommunications	590	3.43%	96.5	56.9	16,859,888	65,054,955
46 - natural resources	124	0.72%	101.9	56.9	18,278,260	92,440,017
47 - navigation and mapping	140	0.81%	72.4	52.6	8,071,830	17,629,935
48 - platforms hardware	2	0.01%	23.7	7.2	40,000	56,569
49 - platforms software	295	1.71%	65.2	42.9	5,251,363	13,785,724
50 - privacy and security	839	4.87%	95.9	55.3	11,787,124	27,214,115
51 - productivity	60	0.35%	87.7	55.2	4,671,800	12,350,876
52 - professional services	627	3.64%	110.8	56.7	4,579,468	18,284,959
53 - real estate	686	3.99%	102.6	59.3	3,598,162	17,360,335
54 - robotics	140	0.81%	99.1	60.2	6,587,544	22,014,153
55 - sales and marketing	2,113	12.28%	90.1	53.7	7,326,775	39,372,393
56 - software	4,412	25.63%	93.5	55.2	10,340,961	38,830,541
57 - sports	346	2.01%	91.6	54.4	7,775,010	56,059,254
58 - sustainability	159	0.92%	113.1	57.8	17,793,793	57,390,551
59 - transportation	153	0.89%	100.0	57.6	13,387,691	82,914,538
60 - transportation air water rails	40	0.23%	109.2	58.1	2,501,101	8,998,778

Sector (reference number and name)	Number of companies		Lifetime (in months)		Total funding amount (in USD)	
	N	%	Mean	Sd	Mean	Sd
61 - transportation personal mobility	38	0.22%	94.8	55.6	18,474,076	35,809,086
62 - transportation shipping and delivery	108	0.63%	94.7	56.8	8,430,936	26,328,092
63 - transportation vehicles	256	1.49%	97.7	54.2	12,436,133	71,478,907
64 - travel and tourism	304	1.77%	87.9	58.6	6,164,522	32,909,118
All companies	**17,213**		**95.0**	**56.1**	**9,416,931**	**49,302,740**

4. Acquiring companies

In order to get a complete view of the acquisition events, after carrying out the analysis of acquired companies, an investigation of the acquiring companies was also conducted. Of the total 17,213 acquisitions in the sample, 10,526 unique acquiring companies were identified. It is interesting to note that the majority of the acquiring companies (74%) made only one acquisition, 23% have performed from 1 to 5 operations and only 2% made 5 to 10 acquisitions. While acquisition transactions are very scattered with respect to acquiring companies, it is also possible to identify large players who are very active in this type of operations. Specifically, the top 15 large companies by number of acquisitions were identified. Table 2 reports the numbers of acquisitions made by each company along with the average age of the startups acquired and the average total amount of funding the startups raised prior to their acquisition. Statistics were only calculated on the companies included in the sample considered in this study. Both the number of company acquisitions in the sample and the total number of acquisitions in Crunchbase for each large company are then reported for accuracy. Given the criteria used to build the sample, the companies not considered were those: not based in the United States, founded before 2000, not reporting the foundation or acquisition dates, not stating the amount of all funding rounds. Looking at the number of acquisitions made, Google is certainly the most active large company (104 acquisitions), followed by Cisco (71), Microsoft (64) and Oracle (41). Thus, the top four acquiring companies are all in the software industry.

An interesting insight emerges from the analysis of the average lifespan of startups acquired by large companies. From the analysis carried out on the 17,213 companies in the sample, it emerged that the average time between foundation and acquisition was 95 months (7.9 years). Comparing this result with the time periods reported in Table 2 reveals that, on average, large tech companies have a very quick approach to acquisition. In this regard, Twitter turns out to be the fastest, going to acquire startups on average just over 3.3 years after their foundation. Faster than average, are also Yahoo (after 3.8 years), Facebook (4.0), Google (4.1), Apple (5.1), Amazon (5.4), Cisco (5.7), Microsoft (6.0), Salesforce (6.4), and Oracle (7.4). Another interesting finding regards the average amount of funding raised by the startups acquired by top large companies. In this regard, the average value of all the 17,213 companies in the sample was 9,416,931 USD. It's immediately noticeable how the startups acquired by Salesforce raised much more investment on average (about $33.0 MUSD), as have those of Cisco (21.4 MUSD) and IBM (20.7 MUSD). In comparison, startups acquired by Oracle, Apple and Facebook had raised about 18 MUSD, those acquired by Microsoft and Amazon about 15 MUSD, those by Yahoo 12 MUSD and those by Google 10 MUSD. These results are significant for both investors and entrepreneurs as reference for their exit strategies. A startup aiming, for example, to be acquired by a fast large company, would in fact know that it would have relatively short time to go for an exit and is expected to raise a certain amount of money first. On the other hand, an investor could estimate a duration of the investment before selling his/her shares and should support the company to raise a certain amount of capital before the acquisition. These are average values, but may be useful as a reference.

Table 2: Top 15 large companies for number of acquisitions

Acquirer name	N. acquisitions in the sample	N. acquisitions in Crunchbase	Average time for acquisition (months)		Average total funding raised by the acquired companies (USD)		
	N	N	Mean	Sd	Mean	Sd	N. not NA
Google	104	245	49.5	32.8	10,615,845	26,629,291	58
Cisco	71	231	69.0	45.3	21,451,817	35,593,313	44
Microsoft	64	235	71.5	42.2	15,576,446	29,395,566	45
Oracle	41	142	88.9	38.7	18,388,739	22,613,229	25
HUB International	40	307	124.6	46.7	NA	NA	0

Acquirer name	N. acquisitions in the sample	N. acquisitions in Crunchbase	Average time for acquisition (months)		Average total funding raised by the acquired companies (USD)		
IBM	39	191	97.1	47.0	20,750,889	23,287,246	30
Yahoo	39	120	45.5	24.7	12,043,923	22,962,290	26
Apple	39	123	61.5	34.9	18,373,994	28,502,453	6
Accenture	38	190	118.1	49.8	2,394,737	7,323,747	27
Gallagher	38	373	118.0	47.4	NA	NA	1
Facebook	38	88	47.8	42.8	18,260,263	40,810,582	23
Salesforce	31	66	76.5	50.8	32,990,245	48,891,097	27
Twitter	30	61	39.4	27.0	1,394,167	2,655,660	14
Assured Partners	30	200	122.6	45.2	NA	NA	0
Amazon	28	87	65.2	39.6	15,234,459	40,250,041	18
All acquisitions	**670**	**2,659**	**76.2**	**1.8**	**12,909,729**	**28,366,499**	

5. Results

The outcomes of the analysis conducted on the acquired companies, were combined in order to relate the investigated variables: the speed of exit and the raised capital during the companies' lifecycle. By combining these two dimensions, it was then possible to create a matrix in which each sector has been positioned within four quadrants, considering the variables "acquisition speed" (low, high) and "raised capital" (low, high). Figure 4 shows how the 64 considered sectors are located in the matrix. The top left section of the figure maps only the position of sectors within the matrix, while the main representation adds an additional dimension of analysis and is presented as a bubble chart. The size of each circle is proportional to the number of ventures in each sector. The origins of the axes are positioned at the average values of speed and investment calculated on all 17,213 companies. This approach allows for immediate identification of sectors that are slower/faster than the average and relates them to their ability to attract lower/higher than average investments. For example, the lower left quadrant contains sectors that are fast-paced but not likely to attract much investment such as gaming (label 28), navigation and mapping (47), media social media (43), community and lifestyle (14), media - publishing (42). On the opposite side, in the upper right quadrant, are the sectors whose companies are slower to exit but are capable of attracting a large amount of investment such as sustainability (58), healthcare (31), natural resources (46), electronic hardware (23), life science and biotechnology (35) and communication protocols (13). The top left quadrant, on the other hand, contains perhaps the most interesting sectors, whose companies are being acquired faster than average and are able to attract more funding. These sectors are for example cloud (11), as a service (6), data and analytics (19), media - video (44), media - contents management (37). Finally, the bottom right quadrant groups together the more traditional sectors, whose startups are on average neither able to be acquired quickly, nor to attract large amount of capital. These sectors are for example professional services (52), real estate (53), manufacturing (36) and food and beverage (27).

Using this matrix, both venture capitalists and business angels can have a benchmark for various industries to use in their decision-making process. When evaluating a potential investment, they could, for example, analyse the timing of any planned exit and the fundraising strategy proposed by the company and compare it with the statistics of the sector in which the startup operates. The same matrix could then be used to create balanced investment portfolios, including companies from different industries that have different levels of risk of not reaching an exit. On the other hand, the results of this study could also be used by entrepreneurs who wish to have a baseline of the speed/funding profiles of other successful firms in their industry. Finally, since the size of each circle is proportional to the number of ventures operating in each sector, considering the vertical position of each bubble (i.e., the amount of investment raised) the matrix allows also to visually estimate the relative importance of each sectors in terms of raised capital as a proxy for the acquisition value (the value is higher as the diameter of the circles increases and for greater values on the y-axis). Then, considering the analysis performed on the top 15 acquiring companies, a similar representation was created in order to have a picture of both side of the acquisition phenomenon.

Figure **5** shows a matrix having on the horizontal axis the average time taken by a large company to acquire a startup and on the vertical axis the average amount of investments raised by the companies before the acquisition. The top 15 acquiring companies are represented by a circle whose diameter is proportional to the companies acquired in the sample. The origin of the solid axes refers to the average values calculated over the

acquisitions made by the top companies, while the origin of the dashed axes refers to the averages computed over the total 17,213 acquisitions in the sample. An analysis of the four quadrants makes clear the different strategies adopted by the considered large companies. When compared to the averages of all acquisitions in the sample, those made by top acquirers are generally much faster (with the exception of a few companies in more traditional industries such as Accenture, Assured Partners, HUB International and Gallagher). Especially fast are then Twitter, Google, Facebook and Yahoo. With the exception of Twitter and Accenture, all companies acquired by one of the top players on average raised more funding. Particularly focused on the investments previously raised are Cisco, IBM, Apple, Facebook, Oracle, Microsoft and Amazon. By considering the quadrant into which a startup can or wants to re-enter, this matrix can enable entrepreneurs and investors to plan a targeted exit strategy.

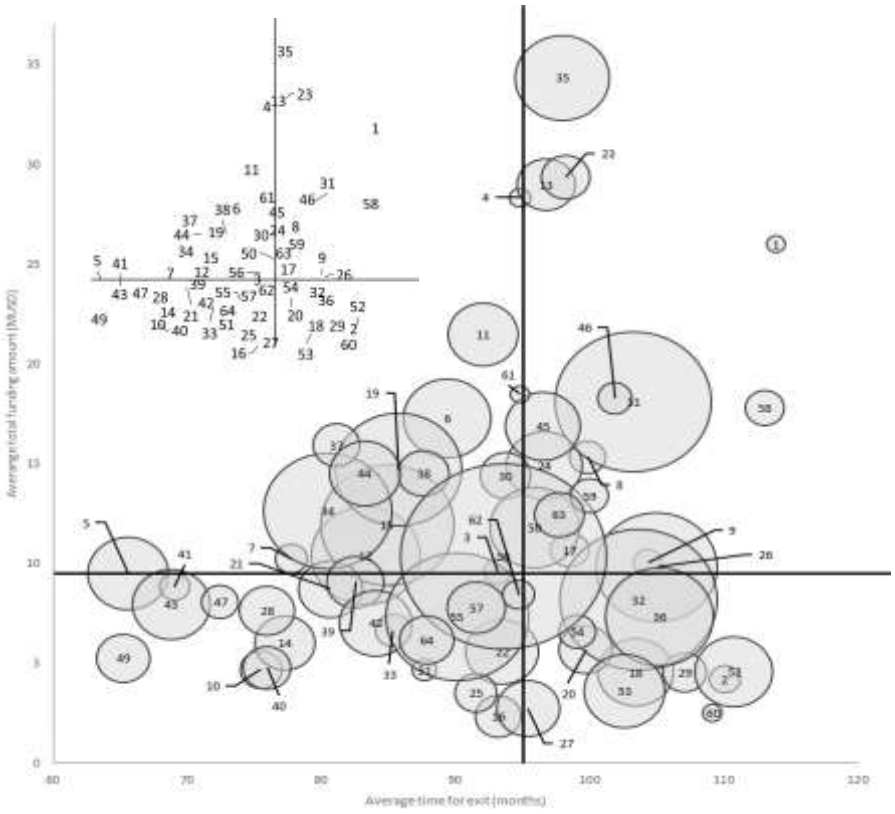

Figure 4: Acquired companies' average speed VS average funding, before acquisitions, by sector

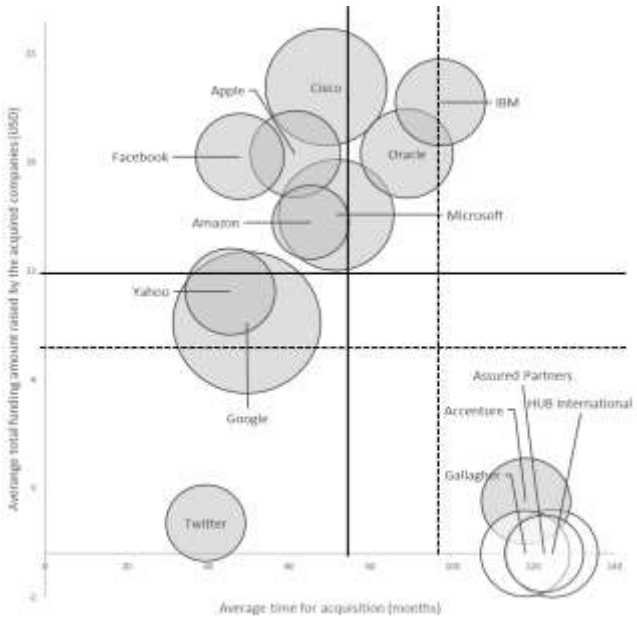

Figure 5: 6: Top acquiring companies' average speed VS average funding raised by the acquired companies

6. Conclusion and opportunities for future research

This paper analysed 17,213 startup acquisitions across 64 different technology sectors. The analysis identified 37 sectors in which companies are being acquired faster than average and 27 in which acquisitions generally occur slower. On the other hand, the analysis of the amount of investment raised has made it possible to partition the sectors in exactly two parts of the same number, identifying those areas able to attract more or less investment than the average. The representation in matrix form then made it possible to position the different sectors within four distinct quadrants, according to speed (fast/slow) and investment (high/low). Analysis of the top 15 acquiring companies then allowed to profile their acquisition behaviour in terms of speed and amount of investment raised by the target startups

There are some limitations to the analysis performed due to the nature of data that may provide an opportunity for future research. For example, one of the elements relates to Crunchbase's company classification system, which has already been addressed in the course of this paper. Although Crunchbase provides a useful classification scheme, the categories used in both the "category list" and "category group list" variables contain nonhomogeneous information. In fact, industries (e.g., "automotive"), business functions (e.g., "marketing") and technologies (e.g., "machine learning") can appear in the same field. Moreover, the classification system includes some over-represented and catchall categories (e.g., "software," and "ICT") that could be used to describe a large number of companies in the database. On the other hand, some categories include a really small number of companies and could therefore be classified more effectively. Statistics for the 10 industries with fewer than 100 companies have been reported in this paper for completeness and consistency but are not actually very robust. It would also be useful for each company to be associated with one and only one category, in order to avoid the overlap of data (e.g., related to investments) of companies belonging to multiple categories. An improvement of the classification scheme could be done by using machine learning techniques for classifying company descriptions (already provided by Crunchbase) through Natural Language Processing algorithms. Considering instead the specific analysis of exits, it would then be interesting to investigate the monetary value of individual acquisitions. Crunchbase provides this data for a small number of companies that does not currently allow for a comprehensive statistical analysis across all sectors. This information could be found online through data mining techniques.

Another possible future development could be to repeat the same analysis performed in this study for all ventures that have made an IPO, so that results can be compared.

Finally, for a correct interpretation of the presented results, it should be noted that the statistical values have been computed considering the data available on Crunchbase. While the information regarding the time of acquisition is complete for every company in the sample, those regarding the funding were not available for all companies. In conclusion, this study gives researchers and practitioners a detailed map of startup acquisitions carried out on a large sample of tech companies. The obtained results give a cross-sector reference to support the decision-making process of both investors and entrepreneurs.

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A Deep Learning Model for Startups Evaluation Using Time Series Analysis

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Abstract: In the field of entrepreneurial finance, both academic researchers and venture capital firms are exploring the use of data-driven approaches to the analysis of entrepreneurial projects. For example, using the data provided by Crunchbase, some researchers have developed machine learning models aimed at predicting the exit event of startup companies. However, these previous contributions have always looked at ventures as static entities over time, only considering the values assumed by the key variables at the time of data extraction. This paper aims to propose a new modelling approach, based on the analysis of the evolution of companies over time. The work considers a sample of 10,211 US-based companies, appropriately selected through a sequence of data processing activities. The rationale applied to reorganize the information and design a database ready to be used for a temporal analysis is described. In particular, each firm is modelled considering three different groups of features whose values change as the company evolve and therefore describe the key milestones achieved. In this regard, the number and amount of funding rounds over time, the number of investors involved and the number of patents obtained over the years are considered. To highlight the importance of the evolution of these variables over time, their statistical trends are reported within a 10-year time window from the companies' foundation. Considering a binary classification problem aimed at predicting whether or not a startup exit event will occur, statistics are presented for the two groups of companies, those that have made an exit or not. Figures show how this approach makes it possible to achieve a greater level of detail on the characteristics of the companies, not otherwise obtainable without considering the time factor. The obtained dataset is then used to train a binary deep learning classifier designed to perform time series analysis. The results obtained confirm the effectiveness of the applied modelling strategy. The obtained model is in fact able to predict whether a company will make an exit within 10 years of its foundation with a recall equal to 93%.

Keywords: startup, venture capital, machine learning, time series analysis, Crunchbase

1. Introduction

When evaluating candidate deals for investment, venture capitalists (VCs) and angel investors apply a set of well-established criteria aimed at minimizing risk and choosing startups that will be able to achieve the projected Return on Investment (ROI) (Ferrati and Muffatto, 2021 a).

From the literature, it is known that the survival rate for VC-backed companies is higher than for non-VC-backed ones (Kunkel and Hofer, 1990). However, from a venture capitalist's perspective, the startups success rate is still quite low. For example, according to Shikhar Ghosh, of Harvard Business School, "*If failure is defined as failing to see the projected return on investment - say, a specific revenue growth rate or date to break even on cash flow - then more than 95% of start-ups fail"* (Gage, 2012).

To improve their investment performance, a growing number of venture capital firms are starting to apply a strong data-driven approach to support their decision-making process. In fact, a new generation of data-driven VCs firms is approaching the funding process in a more scientific way, by analysing large amounts of data leveraging data mining techniques. Developing effective artificial intelligence models to identify, evaluate, select and support the most promising startups could provide investors with a new competitive advantage capable of redefining the landscape and roles within the VC industry.

From an investor's perspective, the critical financial milestone that defines the success of a startup company is the ability to make an exit, either by being acquired by a larger company (M&A) or by going public through an Initial Public Offering (IPO). Both strategies provide shareholders with the opportunity to obtain cash in exchange for their equity stake (Cumming and MacIntosh, 2003). Knowing in advance, with some degree of accuracy, the

possibility that a startup company may exit in the future can enable venture capital firms to reduce the degree of uncertainty and conduct more accurate assessments.

Given the importance an exit, this paper explores the development of a machine learning model to predict whether a startup will be acquired or will make an IPO within a time window of 10 years from its foundation. To this end, Crunchbase was used as the primary source of data (Ferrati and Muffatto, 2020 a), while also integrating other information useful to the feature engineering process.

From the analysis of previous research, this paper aims to contribute by introducing a new methodological perspective. Specifically, previous works have modelled startups as static entities, using features in a fixed way, taking into consideration only their final value at the time when the data were extracted. This approach is actually distant from the way a company works, as it does not consider how certain key variables evolve throughout the life cycle of a company. In this paper we propose a different way of looking at the modelling process, no longer viewing a startup through a simple picture of its most recent state, but rather going to consider its evolution over time. In this way, we aim at introducing a dynamism into the analysis, as if we were looking at several frames of a company taken over time, investigating the relationships between those photographs.

This paper is organized as follows. Section 2 gives an overview of the approach used in previous literature. Section 3 describes the considered data sources and details the steps taken to obtain a consistent sample of companies. The feature engineering process for the construction and organization of relevant features is described in Section 4, while Section 5 provides some descriptive statistics on key variables. Section 6 describes the architecture of the proposed model while Section 7 provides the setup of the experiment and reports the final results. Finally, Section 8 discusses the conclusions of this work and proposes some suggestions for future research.

2. Related works

The topic of generating machine learning models to support equity investors' decision-making is being investigated in the literature by a growing number of contributions, also using the Crunchbase database (Ferrati and Muffatto, 2021 b). Specifically, the problem of predicting the exit of a startup company, has raised great interest among researchers. One of the first works aimed to predict startups M&As by integrating the profiles of companies and people on Crunchbase with the news articles from TechCrunch (Xiang et al., 2012). This work considered two main class of features: factual features (e.g., basic, financial and managerial features) and topic features. Topic modelling techniques were then applied to analyse TechCrunch articles and from the results, Bayesian Network outperformed Support Vector Machines and Logistic Regression and was then used as the primary learning algorithm. Another contribution (Krishna, Agrawal and Choudhary, 2016) considered more than 20 key factors to predict the success or failure of companies. Examples of information considered include the funding rounds raised by each company, the estimated company valuation after each investment, the estimated burn rate and some other key factors designed by the authors themselves and called "severity factors" that contribute greatly to improving the performance of the applied models. The paper reports the results for 6 of more than 30 techniques tested using the WEKA toolkit for classification, analysis and modelling. Random Forest, ADTrees and Simple Logistics were the most performing algorithms. A different approach was applied by Bo Guang Huang (2016) who started with the creation of an investment network structure and implemented network analysis techniques to predict whether a startup would have been acquired, made an IPO or would have been valued at least $1B. Starting from the definition of two types of nodes, investors on the one side and startups on the other, three investment network graphs were created. The first graph considered both startups and investors with edges representing the investments made by investors in startups. The second graph considered only investors with edges representing funding rounds in which multiple investors participated together. Finally, the third structure considered only startups and edges represented the investors that startups have in common. Among the different algorithms implemented in R, Random Forrest generally performed better than others but accuracy was still quite low (around 70%). Another interesting approach was applied by Bento (2017) who obtained a total of 156 features after a discretization process of a set of 36 initial features related to funding rounds, location, industry, founders, etc. Three different algorithms were applied (Logistic Regression, Linear SVC and Random Forest) and the best result was obtained by Random Forest. It is also interesting to note that the author applied SMOTE (Synthetic Minority Over-Sampling Technique) to perform an oversampling of the minority class. The obtained results depended on the way in which oversampling was carried out.

Based on the findings of previous literature, the next sections explore the potential for an innovative approach to the problem, looking at companies as dynamic entities evolving over time.

3. Data retrieval and data processing

The predictive ability of a machine learning model is closely related to the quality of the input data. Therefore, choosing the most suitable data source to solve a specific problem is a critical task. In this paper, Crunchbase has been selected as the main source of information. Crunchbase is an online platform that collects and provides business-related data about the main stakeholders of entrepreneurial ecosystems, such as innovative companies, investors, entrepreneurs, universities, etc. The considered version of the database is dated May 21, 2019. In order to further enrich the Crunchbase's information contents, two additional sources have been integrated, specifically: the United States Patent and Trademark Office (USPTO) dataset and the CB Insights Top Investors list. These resources allowed to add to each company some key information related to their intellectual property and the success rate of their investors. A complete description of the data integration process can be found in Ferrati and Muffatto (2020 b).

In order to obtain a consistent dataset, only companies headquartered in the United States and established between 2000-1-1 and 2018-12-31 were considered. This operation led to the identification of an intermediate sample of 138,251 ventures.

Since the dataset has been used to train a model taking into account the evolution of each company through their business life cycle, the life span of each venture has been determined. To correctly calculate the lifespan of each company, the information provided by the Crunchbase's categorical variable "status" was considered. This field can take four different values that indicate the current state of each company i.e., acquired, IPO, closed or operating. To evaluate the life cycle's duration, in this phase it was decided to consider an observation time window of 10 years from the foundation of each company. In the case of companies with status equal to "acquired", "IPO" or "closed", all companies for which this event occurred after 10 years from their foundation were excluded. On the other hand, to consistently manage companies with status equal to "operating", a subtle procedure was applied. In fact, the future of these companies is uncertain since they did not exit or even close. In order to handle these cases consistently, it was decided to consider only operating companies that have been in business for at least 10 years (to ensure that they did not made an exit before the end of the considered period). This strategy has not been considered in the previous literature. In fact, previous contributions considered still-operating companies as companies that have not made an exit, and therefore treats them as unsuccessful ventures, just like companies that have closed. Therefore, it is worth to emphasize the importance of considering specific time windows for a proper formulation of the model scope. The choice of 10 years as cut-off value was made by calculating the lifetime of the companies in each status. Based on the sample of 138,251 companies, it was observed that the percentage of companies under the age of 10 was 72% for operating companies, 74% for acquired companies, 85% for IPO companies and 96% for closed companies. Therefore, the 10-year cut-off was considered to be a good compromise between the number of companies to be kept in the dataset and years to be analysed.

For companies whose status was equal to "acquired", "IPO" or "closed", the difference between the date of these events and the company's establishment date was calculated, and a new feature was added to report the number of months of life of each venture. On the other hand, all operating companies were at least 10 years old, and their relevant features' values were actually taken into account up to the 10th year.

Once the lifecycle analysis was performed, the value of the target variable could then be defined. Since the proposed model aims to predict whether a company will make an exit within 10 years from its foundation, a boolean target variable has been defined. Thus, by considering the "status" variable, a new "target" variable has been created, assuming value equal to 1 for companies with status equal to "acquired" or "IPO" and a zero value in the other cases.

In order to obtain a consistent and robust sample, two other data processing steps were performed: excluding companies with no funding rounds, excluding companies with at least one funding round but not declaring the amount of each raised round. Finally, companies with outliers in four key variables (number of founders, number of patents, number of funding rounds and funding rounds' amount) were excluded from the sample.

At the end of the data processing phase, a consistent sample of 10,211 companies was obtained.

Since the proposed model consider the evolution of companies over time, it is important to analyse the ventures life-span. Table 1 reports the number of companies whose life cycle has ended in the different years in the column. It should be remembered that the life cycle is considered terminated when a company exits or closes, while all operating companies are exactly 10 years old. From these figures, it is interesting to calculate the percentage of companies in the dataset that made an exit (acquired or IPO) before the beginning of the *i*-th year. In particular, 37% of companies made an exit before the beginning of their 4th year of life, 66% before the beginning of the 6th year of life and 87% before the beginning of the 8th year. In a complementary way, Table 2 shows the number of companies whose life cycle was not yet finished before the end of their *i*-th year of life. It can be seen how the number of companies decreases over the years. In fact, while all companies (10,211) are considered in the first year, some of them have exited or closed at the end of the second year, and so on. From the moment a company exits or closes, the feature values for subsequent years are no longer available (i.e., they do not exist) so the observation ends and the company is no longer part of the analysis.

Table 1: Distribution of companies by life span and status

	0< y <=1	**1< y <=2**	**2< y <=3**	**3< y <=4**	**4< y <=5**	**5< y <=6**	**6< y <=7**	**7< y <=8**	**8< y <=9**	**9< y <=10**	**Total**
Acquired	28	256	476	564	559	508	418	327	252	209	3,597
IPO	8	14	27	26	33	28	31	19	23	23	232
Closed	70	223	270	276	236	159	149	89	62	58	1,592
Operating	0	0	0	0	0	0	0	0	0	4,790	4,790
All	**106**	**493**	**773**	**866**	**828**	**695**	**598**	**435**	**337**	**5,080**	**10,211**

Table 2: Number of companies still active during the *i*-th year, classified by label

	1 yo	**2 yo**	**3 yo**	**4 yo**	**5 yo**	**6 yo**	**7 yo**	**8 yo**	**9 yo**	**10 yo**
Target = 1	3,829	3,793	3,523	3,020	2,430	1,838	1,302	853	507	232
Target = 0	6,382	6,312	6,089	5,819	5,543	5,307	5,148	4,999	4,910	4,848
All	**10,211**	**10,105**	**9,612**	**8,839**	**7,973**	**7,145**	**6,450**	**5,852**	**5,417**	**5,080**

4. Feature engineering

Once the final dataset was obtained, a feature engineering process was carried out to identify the most relevant variables and design a dataset structure to describe the companies' evolution over time.

The process was carried out in two steps. First, the Crunchbase's funding rounds and investments datasets, together with other external data sources (USPTO patents and CB Insights top investors) were integrated into the company dataset. After taking into account the dates on which every specific event occurred (e.g., raising a funding round) the information was reorganized so as to create a sequence of values of the same features for the analysis of their variation in the first 10 years of the companies' life span. The considered groups of features are related to three main topics of analysis: funding rounds, investors and intellectual property.

- **Funding rounds.** One of the most significant data provided by Crunchbase regards the funding rounds collected by each company. The information in the "Funding Rounds" dataset has been filtered by considering only the rounds raised by the companies in the sample and furthermore, as described before, all companies that have never got an investment have been excluded from the dataset. For each of the 10 years of life of the companies, 5 features have been created: the total number of rounds collected up to the *i*-th year, the number of new rounds that took place during the *i*-th year, the total amount (in USD) raised up to the *i*-th year, the amount (in USD) of the new rounds that took place during the *i*-th year and finally the ratio between the total amount (in USD) raised up to the *i*-th year and the number of months of the enterprise's life up to the *i*-th year (i.e., the burn rate up to the *i*-th year).
- **Investors.** For each funding round considered, the "investments" and "investors" datasets have been used to identify the profiles of the investors participating in each round. For each of the 10 years of life of the companies, 3 features have been created: the total number of investors involved up to the *i*-th year, the number of unique investors up to the *i*-th year (i.e. considering only once those investors who have made more than one investment in the same venture) and the number of top investors who have invested in the company up to the *i*-th year. The latter feature was created by integrating the information contained in CB

Insights top investors list. Data integration has been carried out by considering the name of the investors and then checking their investment portfolio to resolve any case of uncertainty.

- **Intellectual property**. Since the companies in the sample are all located in the USA, the Crunchbase data were integrated with the USPTO Patents View platform. For each company the assigned patents were identified and for each of their 10 years of life, 7 features have been created: the total number of patents granted to the company up to the *i*-th year, the number of new patents achieved during the *i*-th year, the total number of utility patents granted to the company up to the *i*-th year, the total number of claims of all patents obtained up to the *i*-th year and the average number of claims for patents obtained up to the *i*-th year. Considering the high technology profile of the analysed companies, the number of patents granted up to the *i*-th year within two key classes was also considered according to the Cooperative Patent Classification (CPC): G06 (computing; calculating; counting) and H04 (electric communication technique). Other CPC classes that were initially considered were not relevant to the classification.

The feature engineering process then led to the identification of 15 relevant features. The values of each feature were analysed for all 10 years under consideration, and then their structure was repeated 10 times, finally getting a total of 150 features (i.e., 15x10). Figure 1 shows the dataset structure designed to enable the model to analyse the companies' evolution over time. It can be noted how the columns of the dataset have been organized in such a way that the 15 relevant features were grouped together and longitudinally repeated 10 times. Each group contains the values of the 15 features for the *i*-th year, with *i* ranging from 1 to 10.

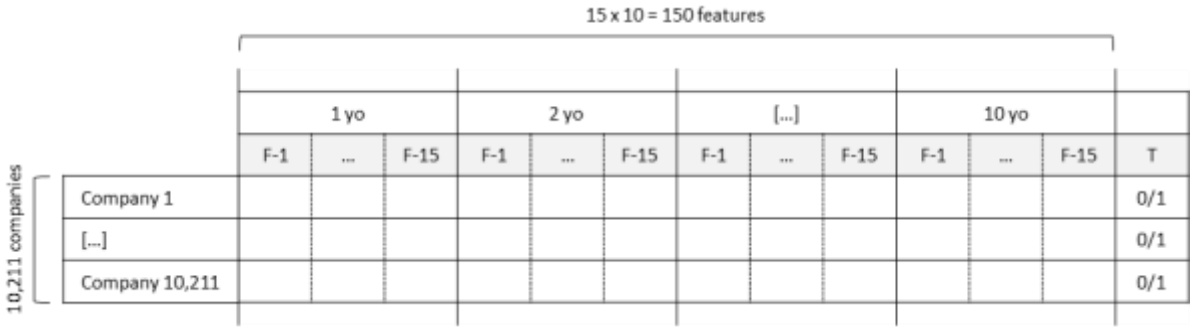

Figure 1: Implemented data structure to enable analysis of companies over time

5. Data exploration

Once the feature engineering process was complete, it was important to understand the content of the final dataset before proceeding with model design. To highlight the difference with the "static" approach used in the previous literature, a comparison of the information obtainable through an analysis over time is reported. Label 1 identifies companies that have made an exit within 10 years of their foundation, while all other companies are marked with label 0.

A key aspect of the analysis concerns the companies' ability to raise funding rounds. Figure 2 shows the distribution of the total funding amount raised by companies with label 1 and label 0 respectively. It can be noticed that the distribution of label 0 companies shifts more to lower values (left), while the distribution of label 1 companies shifts more to the right. For example, 41% of label 0 companies raised funds of less than US$1 million, while just 18% of companies with label 1 raised up to $1 million. This means that nearly half of label 0 companies can usually collect about the same value as a seed round, but they are not able go any further. The result is different for the $1-5 million range. In fact, it can be seen that about 30% of companies raise up to this amount in both categories. The same distribution is also seen for the $5-10 million range, with about 14% of companies with both label 1 and label 0 within this range. On the other hand, the situation is different when the total amount of investments exceeds $10 million. In fact, about 37% of label 1 companies manage to raise more than $10 million investments, compared to just 13% of label 0 companies. Finally, no label 0 company is able to raise investments of more than $30 million, which is exceeded by 11% of companies with label 1. From these statistics it can be seen how companies that make an exit are actually able to raise higher investments thus managing to grow and scale over time.

Although these statistics already give important information to distinguish between the two classes of companies, they do not allow a model to consider the evolution of companies over time. In fact, considering

only a snapshot of the total investments' values does not allow for any distinction between a company that raises, let's say, $1 million in two years and another one that raises the same amount in seven years. The approach proposed in this paper allows for this type of analysis. To make companies comparable over time, all the following statistics have been made by looking at still active ventures after the same number of years. Figure 3 reports the average total amount of investment raised by companies over time. It can be seen how label 1 companies raise about four times the value of those with label 0. For example, in their first year of life, on average, they are able to raise more than $1,5 million, compared to about $400 thousand of companies with label 0. The gap gets bigger and bigger as time goes by. In fact, when they reach their 5th year, companies with label 1 exceed $10 million investments on average, compared with about $2 million in the other class. Up to year 10, when label 1 companies have raised nearly $20 million on average, label 0 companies have collected about $5 million.

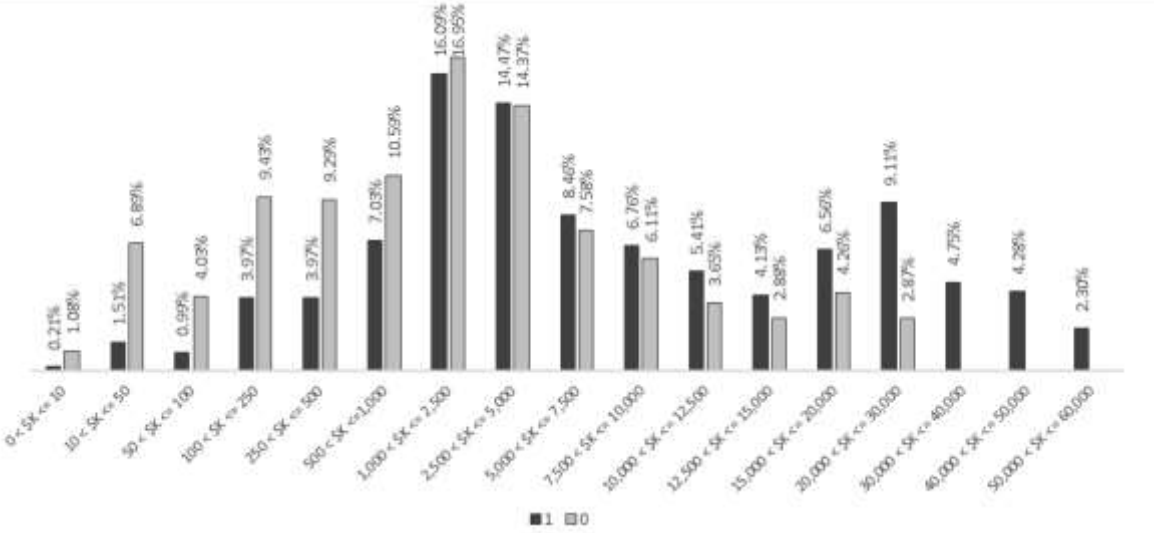

Figure 2: Companies distribution by total amount of investments raised (in thousands of USD)

As regards the number of investors involved, looking at Figure 4 it can be noted that label 1 companies have almost 5 times the number of investors of those with label 0. Considering the trend, it can also be seen that companies that take the longest to make an exit do not actually attract a proportionately growing number of investors. In fact, the trend of the polynomial curve reaches a maximum in the sixth year and then slowly decreases. This trend highlights the importance of engaging more investors especially in the early years of a startup life cycle, when the company needs a boost to grow fast.

Finally, as it concerns intellectual property, Figure 5 shows the average number of patents granted to the considered companies over time. For companies with label 1, it is noticeable that the fastest companies to make an exit have a rather low average number of patents. For example, companies that have already made an exit in the third year have an average of 0.05 patents. However, this value increases rapidly in the following years. For example, companies that have made an exit in the tenth year have on average 2 patents. This trend may be due to the sector in which the analysed ventures do operate. For example, companies operating in the biotech industry are strongly based on intellectual property and generally have a longer life cycle. On the other hand, considering label 0 companies, it can be seen that even after 10 years, the average number of patents is still below one.

The analysis of features over time shows how the approach used in this research actually provides new valuable information for companies' analysis. In fact, looking only at the features' total values does not allow to identify the temporal specificities of the two classes. On the other hand, descriptive statistics show how the variables for the two groups of companies actually show different trends over time. Compared to the previous literature, the present work looks at the problem in a dynamic way, enabling to highlight peculiarities otherwise undetectable.

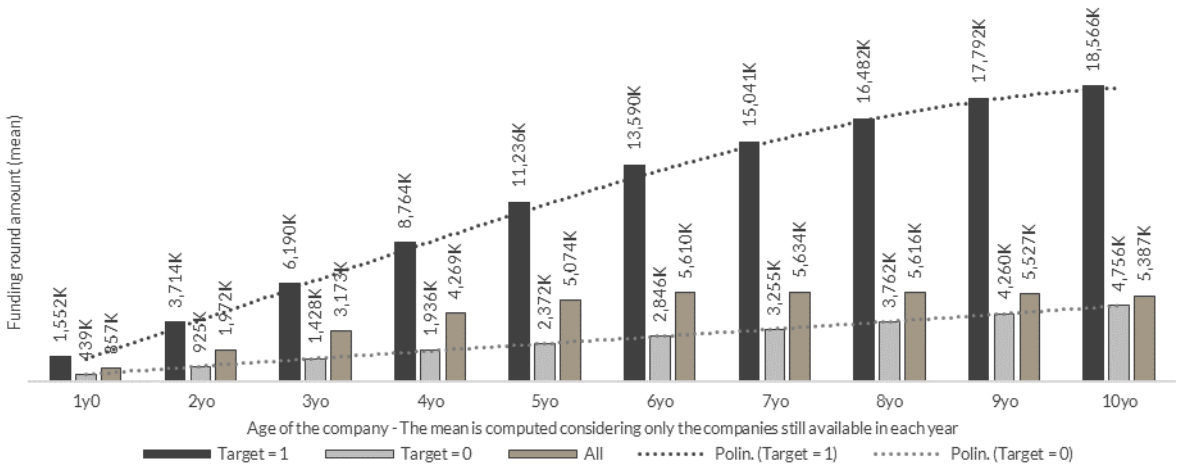

Figure 3: Total funding amount (in thousands of USD) raised over the years (mean)

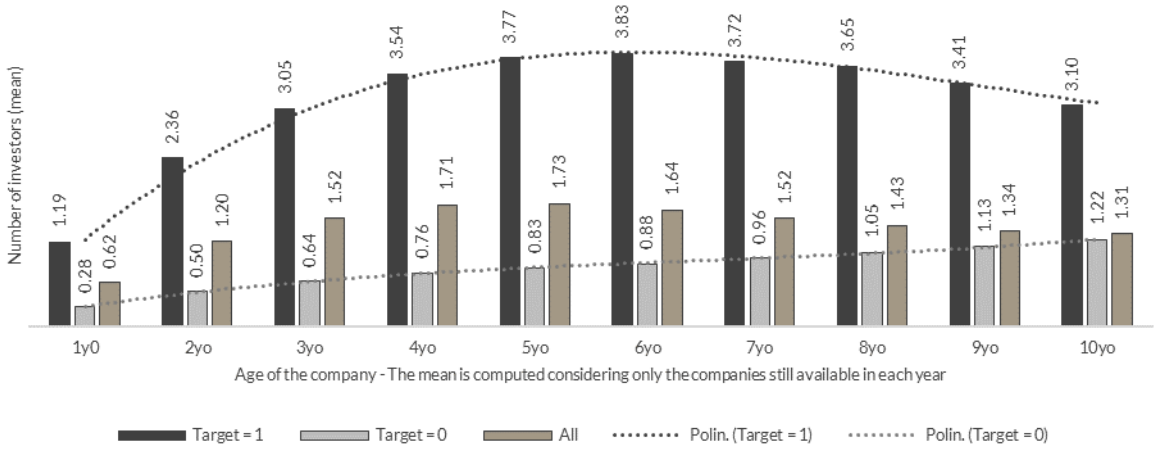

Figure 4: Total number of investors in the companies over the years (mean)

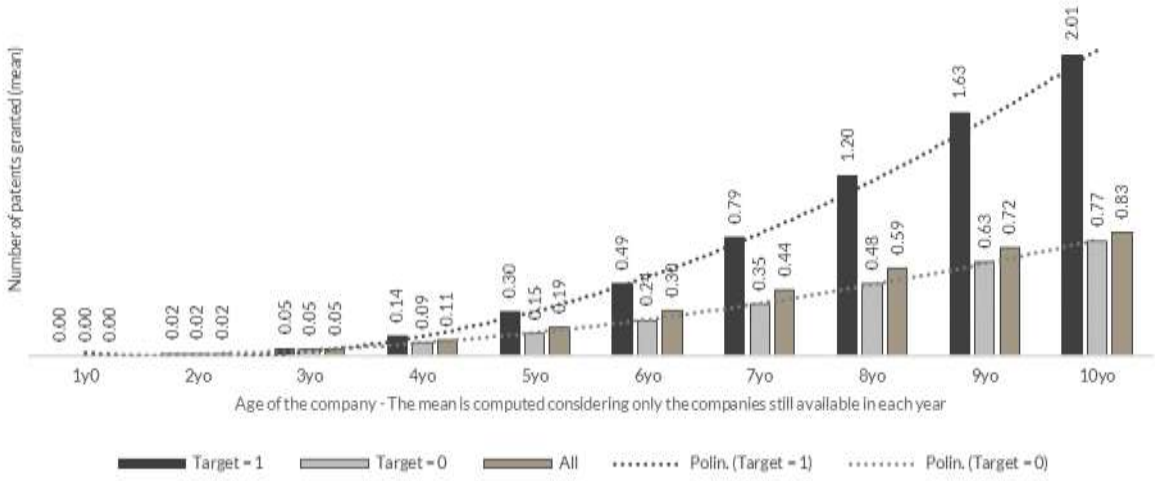

Figure 5: Total number of patents granted over the years (mean)

6. Model design

The proposed model aims to analyse the evolution of companies over time, in order to predict which companies will make an exit within 10 years of their foundation. The problem can be formulated in a binary way and

therefore the target model is in fact a binary classifier. Since classical machine learning models are not suitable for performing analysis over time, it was decided to apply a deep learning approach. The implementation was performed using Python and specifically the Keras library. The model architecture involved a sequence of three different modules: Convolutional Neural Network (CNN), Long Short Term Memory (LSTM) and Deep Neural Network (DNN).

CNNs have been used in their one-dimensional version to analyse local features within the 10 years' time series. CNNs are able to extract effective representation of local salience from raw data by enforcing a local connectivity between neurons. The CNN kernel moves in one direction from the beginning of a time series towards its end, performing convolution. In the proposed model, the data relating to each year have been processed individually by a CNN and the output has been given as the input of a LSTM network to learn the temporal features. LSTMs are a really powerful and well-known subsets of Recurrent Neural Networks (RNNs). These types of network have a temporal dimension that, by taking time and sequence into account, make them able to recognize specific patterns in sequences of data. In fact, RNNs keep information about past inputs so that a feedback loop connects the current decision with the past one. However, since RNNs are generally effective in learning only short-term dependencies, LSTMs were designed to exceed this limit. In fact, LSTMs are very effective in remembering information for longer periods of time (Hochreiter and Schmidhuber, 1997). Finally, the result of the LSTM module has been passed to a DNN, which returned as output the class to which each company belongs, thus predicting whether or not a startup will make an exit within 10 years of its foundation. Overall, the proposed architecture allows for time series analysis, an approach not already used in Crunchbase's literature to predict a startup exit event.

7. Experiment and results

In order to train and validate the deep learning model, the dataset has been divided into two parts, a training set and a test set, considering a ratio of 80% and 20% respectively. Since the complete dataset contains information about 10,211 companies, the training set therefore consisted of 8,168 companies, while the test set included 2,043 companies.

Once the two sets were obtained, a feature scaling operation was performed on the two datasets individually taken. A critical element to deal with was the fact that the two classes in the dataset were highly unbalanced. Of the 10,211 companies in fact, 6,382 (62.5%) were labelled as 0 and 3,829 (37.5%) were labelled as 1. Since this ratio was also propagated in the training and test set, the training set had 5,124 companies labelled 0 and 3,044 labelled 1, while the test set had 1,258 companies labelled 0 and 785 labelled 1. In this research, ADASYN (Adaptive Synthetic) technique was applied to oversample the minority class (He, Bai, Garcia and Li, 2008). It is important to note that the oversampling operation was only applied to the training set. While the model can use also synthetic samples during the training phase, it is very important that only the original data is used in the test phase. Applying ADASYN to the test set would have resulted in an apparent improvement in the model's performance, but this procedure would not have been methodologically correct and fair and results should have been interpreted with great caution. After the oversampling process, the training set was then balanced and counts 5,124 companies labelled as 0 and 5,034 companies labelled as 1. The distribution of the two classes in the test set remained unchanged.

Finally, the model was trained using the training set and its performance was measured on the test set. Table 3 summarize the results achieved by the proposed model. For class 1 the model reached 76% precision, 93% recall and 84% F1-score. On the other hand, for class 0 the model reached 95% precision, 82% recall and 88% F1-score. It can be seen how the model performed particularly well in terms of recall for class 1.

In the context of investors' decision making, it is interesting to provide a practical interpretation of the obtained results. If we consider as successful a company that makes an exit within 10 years of its foundation, recall can be interpreted as follows. A recall of 93% for class 1 means that the ratio between the number of successful companies that the model can correctly classify as successful and the total number of truly successful companies is 93%. High recall means that an algorithm returns most of the relevant results. In this context, the model with the highest recall would identify as many successful companies as possible among all the successful ones in the database.

Table 3: Performance of the proposed model for companies in class 1 and class 0

	Precision	Recall	F1-score
Class 1: companies that have made an exit within 10 years of their foundation	76%	93%	84%
Class 0: companies that have not made an exit within 10 years of their foundation	95%	82%	88%

8. Conclusion and opportunities for future research

In this research a model has been developed to predict whether a startup will perform an exit within a specific time window. Using Crunchbase data, an innovative approach, not yet tested in the Crunchbase previous literature, has been applied. In fact, the proposed model uses a deep learning approach to analyse the evolution of companies over time.

In addition to the research purposes, the proposed model could also be a starting point for developing a tool to support practitioners' decision making. For example, investors could use it in their screening process to identify startups with a higher probability of success and then focus only on interesting companies for a deep analysis. On the other hand, the model could also be used by entrepreneurs who intend to simulate different fundraising scenarios. Once the capital requirement has been established in accordance with the company's business plan, entrepreneurs could simulate the fundraising event by entering an additional input in their company profile at a specific moment in time and then measuring the impact that the specific round would have on the probability of making an exit in the future.

As regards the limits of the present research, it can be noted that the model considers only quantitative features. Due to the lack of data, some key information is not considered e.g., the characteristics of the product/service provided by each company, making it difficult to exactly characterize the value proposition of each venture. This information could be integrated by automatically collecting qualitative information for a more detailed company profiling.

Another important element to consider is the fact that although Crunchbase provides information about exits' occurrence, for the vast majority of companies the information regarding the monetary value of the exit is not available. From an investor's point of view, it is therefore complex to define whether these exits have in fact represented a profitable return on investment or not. Also in this case, it would be interesting to integrate the dataset with the value of the individual exits and possibly also the shares of every shareholder.

In conclusion, the model has returned remarkable results in terms of performance and therefore the applied methodology has been proved to be effective to approach the problem of predicting the exit event of a startup company.

Acknowledgements

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Social Innovation in Food Systems: Towards Food Security and Sustainability

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Abstract: The paper uses the concept of Social Innovation (SI) in the analysis of short supply chains in the food sector in order to understand its role in achieving food security and sustainability values. Food security and the transitions of food systems towards more sustainable models acquired a new relevance within the global scientific and political agendas since the food crisis in 2008. Short food supply chains correspond to one of the important subjects to be addressed by research in food security and sustainability. This importance relies upon the contribution of these forms of commercialization in terms of the dynamization of local economies and the contribution to environmental and ecological values considering the centrality of local products and local businesses (farms), as well as the reduction of intermediaries in the value chain. The paper considers three cases of short food supply chains in the Lisbon Metropolitan Area, addressed through a qualitative approach with the lens of the concept of Social Innovation. The results allow the identification of the dimensions of Social Innovation arising from the working of these short food supply chains, as well as key aspects of these chains such as the critical role played by producers' networks in the supply of weekly baskets of fresh fruits and vegetables.

Keywords: short food supply chains, social innovation, food system, Lisbon Metropolitan Area

1. Introduction

Social Innovation (SI) corresponds to new solutions to social problems envisaging the improvement of the quality of life and the empowerment of territories and communities, through "new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations" (EU, 2010). SI is distinguished from conventional innovation, since "has as its starting point notions of social beneficence and public good that supports people in organizations, communities and society in general" (Dawson & Daniel, 2010, p.11). The paper proposes an analysis of short food supply chains (SFSC) through the lenses of the SI literature, revealing the relevance of alternative commercial models in achieving food security and sustainability goals. It thus considers short supply chains as a form of SI, meaning "reducing the number of intermediaries who are necessary to deliver the final product to the consumer. The shorter the supply chain, the easier it is to maintain and communicate the authenticity and originality of the food in terms of its cultural identity, traditional production methods and the provenance of the ingredients" (EU, 2021, p.12).

This research is in line with a recent OECD study, which stresses that "Food systems matter not only for food security and nutrition and for the livelihoods of those involved in these activities, but also for environmental sustainability" (OECD, 2021). Having this in mind, the paper explores three case studies of short supply chains in the Lisbon Metropolitan Area (LMA) addressing their contribution for food security and sustainability. LMA corresponds to an important territory in food value chain, that besides the market size (commercialization and consumption), presents an expressive relevance in agricultural land use and production. The cases provide good examples of new responses in food sector. On the one hand, short supply chains allow the dynamization of farms and agricultural production, empowering local populations, farmers, their networks and territories; on the other hand, by using local and seasonal production they promote ecological values.

The paper is structured as follows. Section 2 presents the concept of SI and discusses its role in the transformation of food systems, namely their transition towards more sustainable models. It also presents the concept of short food supply chains and discusses it at the lens of SI literature. The study methodology is presented in section 3, followed by the results of the case studies analysis in section 4. The last section presents the main conclusions.

2. Food sector and sustainability: The role of social innovation

2.1 Social innovation revisited

The increasing critical awareness of societal problems is currently associated with a wider acceptance of the need for 'social innovation' (SI) and the very diverse ways of understanding the nature of the challenges at stake. The limits of the conventional market-based innovation in dealing with the complex current problems, and the need to mobilize other types of innovation, such as social innovation, has been addressed by recent literature on sustainability and innovation in order to transform large and complex social systems (Ravazolli & López, 2020; Chifffoleaus & Loconto, 2018; Silvestre & Ţîrcă 2019).

This is the case of the food system and its transition towards more sustainable models, where the negative externalities associated with the industrialization of food production (pollution, loss of biodiversity, health problems) are at the centre of the debate on the sustainability transition. This transition encompasses diverse approaches in terms of food production (e.g., organic agriculture, localized agri-food system', foodshed), and commercialization (e.g., agri-food short chains'; short supply chains), requiring the combination of new technologies with social and institutional innovations (Herrero et al, 2020).

The concept of SI has been increasingly associated with the very limits of state-based responses and relevance of innovation beyond public policies (not as 'an alternative to') to cope with the complexity of contemporary problems (e.g., climate change, economic crisis, unemployment). Although primarily envisaging poor communities, the bottom of the income pyramid (Prahalad, 2005, apud Soete, 2013), the concept has spread to other fields and embraced other objectives. Societal problems would require innovation in public policies (policy integration, cross-sectoral and territorial integration, etc.) as well as innovation in civil society (social and solidarity economy, social entrepreneurship, etc.) and innovation in the relations among them (new forms of governance, multilevel collaborative governance, etc.). Some authors claim that technological solutions already exist to solve many urgent social problems (Brown, 2009, apud Tibbs, 2011). Therefore, the concept of SI enlarges the "economic and technological reading of the role of innovation in development to encompass a more comprehensive societal transformation of human relations and practices" (Moulaert & Nussbaumer, 2008, in McCallum et al, 2009, p.13).

Unsurprisingly, SI is currently at the core of the global agenda of the major international organisations, namely in United Nations (UN), OECD, and European Union (EU). The UN presents SI as being at the root of sustainable development, namely for achieving the Sustainable Development Goals (SDG) by 2030 (Millard, 2017). According to the organization, development relies on social and cultural practices and their changes through time, whether in a top-down or bottom-up, and more slowly, approach, acknowledging that "social innovation approaches are needed as mainstream tools for delivering sustainable development". (Millard, 2017, n.a.).

The role and potential of SI in the improvement of welfare and wellbeing of individuals and communities, envisaging solutions to socio-economic issues, build stronger territorial resilience and better respond to future shocks" is also stressed by the OECD, which launched the 'Social Innovation Forum' in 2000. According to this organization, there is social innovation "whenever new mechanisms and norms consolidate and improve the well-being of individuals, communities and territories in terms of social inclusion, creation of employment, and improved quality of life. Social innovation aims to respond to new needs that are not addressed by the market, and which may encompass conceptual and organisational aspects, and changes in the relationships between communities and respective territories." (OECD, 2000, p.2). More recently, the organization has stressed the dimensions of SI as conceptual, process, product, or organizational change, as well as the important role played by public, non-private, and private actors in SI design and implementation (OECD, http://www.oecd.org/regional/leed/social-innovation.htm; 23 March 2021).

The European Commission presents SIs as innovations that are social in both their ends and their means: "Social innovations are new ideas that meet social needs, create social relationships and form new collaborations. These innovations can be products, services or models addressing unmet needs more effectively" (CE, 2017, p.2). The Commission's actions on SI are developed within the Innovation Union Initiative (2010) and of the Social Investment Package (2013). These include: networking, competition, funding, ecosystems, impact, incubation, and exploration (EC, https://ec.europa.eu/growht/industry/policy/innovation/social_en, 23 March 2021).

SI processes require a diversity of approaches, scales and actors. Ravazzoli and López, for instance, refer that "There is not a unique universal model of social innovation, and it can come in various forms and scales. For instance, it can be led by different actors, or spanning across sectors; it can take the form of a social enterprise, a citizen's movement, or a community trust among other types" (Ravazolli & López, 2020, p.3). Despite this diversity, there are shared and persistent aspects in SI definitions that have been proposed in the last decades, such as novelty, participation, empowerment, and wellbeing. According to the same authors, "What characterizes all forms of social innovation is that active actors/enablers work together to push changes through network interactions, promoting collective action, and a learning process in which different agents address unmet social needs and complex challenges. This is particularly true when actors work together to suggest people-based solutions that both increase the well-being of our cities and communities and achieve sustainable development. (…). Overall, social innovation initiatives are needed in order to move from current unsustainable models of living to new, sustainable ones and accompanying the social and economic transitions (Ravazolli and López, 2020, p.3). This is also true for the food system where important changes are taking place both in developed and developing countries (Smith, 2006; Goodman et al, 2012; Marsden & Morley, 2014; Morgan & Sonnino, 2008).

2.2 How social innovation contributes to more sustainable food systems

The changes of food system towards more sustainable models correspond to different paths and dynamics of the value chain (Cristovão & Tibério, 2009), that is: "i) consumption of local produced food; ii) establishment of direct relations between producers and consumers; iii) revitalization of distribution, processing and production structures; iv) networks of producers, local governments, entrepreneurs and other leaders; v) promotion of local economy and rural development" (idem, p.1). The same authors mention Japan and United States at the middle of XX century as the contexts of emergence of these "movements", which have been expanded to other countries including South Europe.

In the agro-food system, social innovation has been developing over the last decades through a large diversity of forms, both in advanced countries (Adam 2006; Larsson, 2012; Jolink & Niesten, 2015) and developing countries (Seelos & Mair, 2005; Bansal et al, 2019). It is characterized by the active involvement of consumers, and not only of producers. On the part of consumers, it ranges from a new attitude regarding fair trade, concerns with healthy and quality produces and purchase decisions influenced by the environmental impact of their choices. On the part of producers, a variety of responses has been created under the growing awareness of environmental impacts, animal wellbeing issues and the need for a healthy food supply.

However, according to Chiffoleau & Loconto (2018), in the "literature on social innovations is still very limited in its analysis of the agriculture and food sector beyond CSA (and equivalent) systems (Chiffoleau & Loconto, 2018, p.312). Short food supply chains (SFSC) correspond to a commercialization process where exists a direct (producer-consumer) or indirect supply with no more than one intermediary. They are related to geographic as well as relational proximity between producers and consumers. (MAMAOT, 2013: 16). At this regard Marsden et al (2020) refer that it is possible to identify some key characteristics of SFCS that justify their consideration as a social innovation: the re-socialization and the re-spatialization, the redefinition of producer-consumer relations, and the expressions of "struggle" by producers and consumers to adopt new types of supply and demand (Marsden, 2020, p.425).

SFSCs can assume diverse forms. The Portuguese Rural Network (Ministry of Agriculture) identifies the following typology of SFSC:

- Markets of producers: "market dedicated to food and agri-food producers which sell their own production; products with local certification".
- Markets of Bio producers: "market exclusively dedicated to agro and agro-food producers with certification in Bio Production; producers sell their own production; products with local certification".
- Markets of local products: Local or regional markets with direct sale of a local product or various related products.
- Collective supply point: Organization of farmers and agro industrial supplying their own products.

- Agro-Food baskets: Direct and regular supply of local and season agri-food products. The baskets are delivered in a predefined (producer and consumer) place (e.g., consumer home, enterprise, farm, cooperatives, shops).

A systematic literature review in the field of SI (Kumar et al, 2019) shows the increased interest and publication since 2014. The research on SI and alternative ways of commercialization of food products considers particular contexts and authors and their role in the promotion of sustainability. This is the case of social enterprises and social entrepreneurship that offer local products to consumers in urban areas including the use of ICT while maintaining the social links between producers and consumers. This is also the case of other SI initiatives such as bottom-up initiatives, driven by civil society, namely community-supported agriculture, community gardens, and eco-villages (Chiffoleau & Loconto, 2018).

However, it is also important to critically address some presumptions related with the alternatives emerging in food system, such as the local as indicator of quality. In fact, and as Morgan and Sonnino refer, "for many scholars and activists, the contribution of food to sustainable development is inextricably linked to the implementation of re-localization strategies that increase local food production for local consumption" (Morgan & Sonnino, 2008, p.7). The 'perilous trap' of the local is, thus, something that should be considered in the research of alternative food systems. That is, local social relationships, power relations, environmental management practices are not always positive at the local level (Morgan & Sonnino, 2020, p.10). "Protectionism, resistance to the 'other', the minimization of internal differences and separation (…) are all potential outcomes of these defensive forms of localization" (Morgan & Sonnino, 2008, p.10).

Having this in mind, and for the purposes of this research, it is considered that the impact of short supply chains in economic, social, and environmental terms involve the following dimensions:

- Economic: development of local economy by promoting farm production and farmer's income;
- Social: food security; promotion of local employment and, thus, the improvement of local wellbeing;
- Environmental: reduction of CO2 emission, protection of biodiversity and genetic inheritance through the production of local products and food.

By connecting production and consumption in short food chains, these initiatives promote SI through process, product and service in the following domains: i) (re)connection of urban and artificial urban contexts with rural territories through a 'back to basics' movement; ii) promotion of local products, excluded from the global and conventional commercialization circuits; iii) achievement of food security through more sustainable models. Therefore, we defend that in the case of SFSC we are dealing with SI because there is novelty in the commercialization of food products through direct contact between producers and consumers with transformative consequences in food security (access, health, environment).

3. Methodology

The research has initially been centered on an exploratory analysis to identify relevant case studies in order to understand the new emergent projects in LMA agro-food value chain.

The collection and analysis of the information were conducted through qualitative methods of research and diverse research techniques, such as documentary analysis, literature review, and fieldtrips to the farms. Depth semi-structured interviews were conducted with the key actors, that is, the leaders and entrepreneurs of the three cases under analysis. The interviews were recorded with the agreement of the entrepreneurs and considered the following analytical dimensions grounded in the literature: history of the initiative, main drivers of the emergence and development of the initiatives; the profile and motivations of their leaders; the existence and relevance of public support; the characterization of the activities and the distinct business model dimensions, notably the production and commercialization strategies, including the relationships and networking with suppliers, customers and similar producers; the technological options in farming and commercialization; and problems and challenges faced by cases.

From the characterization of the initiatives and their stakeholders it was possible to categorize the interviewees according to their age and education skills: we are dealing with entrepreneurs aged between 30 and 60, and with a high level of education. The interviews were conducted between September 2018 and October 2019. The

conversations (face-to-face) were recorded and transcribed; all the interviewees agreed to participate and were informed about the aim and research purpose; the names have been anonymized.

4. Short food supply chains as social innovation: Case studies in Lisbon Metropolitan Area

The cases of SFSC presented and analyzed were developed by different entities, from private to social enterprises and involving bottom-up experiences. Notwithstanding their differences, they share relevant features: they rely on new forms of relationships between producers and consumers, namely by promoting SFSC in the form of baskets; they are locally rooted, at least at the initial stage; they deploy and rely on networks; and they aim to contribute to mitigate the environmental impact of their activity. The results consider the SFSC developed by those organizations aiming the identification of SI dimensions involved in these initiatives according to the following analytical axes: dimensions of SI promoted by the initiatives; and territorial scale considered in the action of these organizations. The first case is Quinta do Oeste, a family business located in the Lisbon region. In the 1960s, the farm was dedicated to conventional fruit production. In the 2000s, the owners started a process of partial conversion of the farm to an organic production system. According to the current holder, the transformation was mostly motivated by a shift in her personal lifestyle driven by her values regarding environmental sustainability and the quality of production. This is a common feature to many initiatives, where values and social awareness are dominant (Tibbs, 2011).

The business model integrates all phases of the food supply chain (i.e., production, processing, distribution and consumption). The farm presents two types of SFSC: market of producers; and food baskets. In the case of markets, there is a regular participation of the farm in Lisbon region local markets on a weekly basis. The development of food baskets with farm's production is complemented with produces (fruit and vegetables) bought from a network of farmers. Therefore, one first conclusion related with this case is its role in the development of producers' networks in the Portuguese Continent. By doing this, the baskets work as instigators of the local economy in the region were the farm is located, but also in other regions in the country. While maintaining a profitable organic business, the farm is strongly linked to the local economy through job creation and business relationships with other farmers in the region. They intend to complete the conversion of the entire farm area to organic production and expand the range of products, while maintaining their local/regional scope. It is also important to stress that this collaborative arrangement improves the variety of products offered, namely in their own shop, in some local organic markets and in the baskets they distribute weekly in the LMA. Also very important, these informal collaborative networks between organic producers are considered extremely relevant for the exchange of knowledge and information and to diversify the variety and complete the range of products offered, strengthening the business dynamics. A second conclusion of this case is related to the importance of digital tools used in the commercialization of baskets. In fact, the sales channels mentioned above are supported by a strong investment in brand development and online marketing through the new technological platforms and social media (e.g., sending newsletters to big corporations' employees where they create new delivery points). In particular, social media (e.g., Facebook, Instagram) and the company website function as virtual stores. They also aim to improve the proximity with consumers through the organization of different activities in the farm (workshops, field trips, actions with schools). A third conclusion regards the promotion of the sense of belonging and the creation of a community committed to the values of transition to sustainability, supporting the environmental responsibility of the farm (e.g., use of alternatives to plastic in hampers).

The second case is also a private family enterprise, Mimosa Farm. It is located in the Lisbon region rural area, dedicated to the production, processing and distribution of organic produces. In addition to the farm, the enterprise holds two shops (each one including a restaurant) and a distribution automobile fleet. The idea came about following an end-of-course project (agronomy) of one of the family members. In the late 1990s, they had already converted the family farm to a 100% biological system. As the previous case this farm presents two forms of SFSC: participation in city markets on a weekly basis, and food baskets. The distribution of baskets started when organic farming was still a very small niche. A first conclusion related with these baskets is the fact that they are composed by products from different producers in the country (more than two hundred) and abroad (about 50% of the products sold are imported). This is a common conclusion to the previous case - these baskets work as promotors of the producer's network, an important dimension of SI by strengthening local economies and, in both cases, environmental values. Only about one fifth of Quinta da Mimosa's sales is own production, which means that this enterprise became mainly an intermediary and distributor. In fact, they have become an important intermediary for the distribution of national and international organic products, which

allows small producers to access much larger markets. A second conclusion of this case relates to digital tools in marketing: they are used but their importance declined, because the firm became a reference in the domestic organic market. Unlike the previous case, Mimosa is now a more conventional business, with four distinctive characteristics: weak local roots, distribution orientation, clear focus on expansion into the national market, and anchoring in dominant retail chains. However, similarly to the previous case, this case has a clear focus on organic and quality food, and the initial main motivation was also to farm in an environmentally responsible way.

The third case is a short supply chain promoted by a local development association in the Lisbon region. Inspired by a French project, the Green Baskets network emerged as an initiative of community supported agriculture (CSA), in 2009, involving producers and local authorities (e.g. municipalities and local development agencies). Supported by European Union funds (the EQUAL program of the European Social Fund), this project aimed to address the challenges of traditional agriculture (i.e., small scale and family farming). At that time, the territorial diagnosis made by the local development association identified a sector with no efficient means to sell their production (i.e., commercial channels and marketing strategies for local products), maintained by an aging population that was on the verge of abandoning the activity. In this context, it was urgent to create mechanisms to revitalize the agricultural structures and commercialize production, taking advantage of the proximity between producers and consumers in peri-urban areas.

Initially, this collaborative network included only five producers, selling around 20 baskets per week in the district of Setúbal. From 2010, with the boost of a new rural development program, other domestic groups joined the project (i.e., regional development agencies and the Local Action Groups) and disseminated the Green Baskets model to their territories in the Portuguese continent. The business model is based on local short supply chains, each center assuming local/regional distribution. The producers aggregate the goods in one sales point, and the consumers collect the baskets, according to the specifications set out on the online orders platform (i.e., type of products, schedule). The baskets contain seasonal fresh products, which may come from traditional agriculture (with a minimum use of pesticides) or organic farming. Currently, the network aggregates 117 centers in all country, which correspond to 124 farms, incorporating more than 4000 weekly customers and 158 delivery spots, which provide approximately 35-36 tons of fruits and horticulture products per week.

Over the past few years, the producers have begun to recognize Green Baskets as a profitable business attracting new members to the network. Mostly during the years of the economic crisis (2008), Green Baskets have become an important complement to the family budget, providing a stable and reliable income. In some cases, they became a full-time activity, particularly for young producers who obtained organic certification. Technical support, advisory services and the exchange of knowledge, experiences and information - a learning platform - provided by the program is an extra motivation for the producers joining the network.

Furthermore, the Green Baskets collaborative network is based on relationships of trust and proximity between consumers and producers. This sense of community and local identity, stirred by the new consumers' values (i.e., health, environment, justice) and the institutional support were the key elements for the success of the project, promoting the co-creation of a more sustainable food system and new inter-territorial development model. However, maintaining this model in the future entails numerous costs (i.e., registered trademark, management of the online platform) for the local association, founder and incubator of the project. Nowadays, the Green Baskets model has scaled up from the local experiment, assuming a robust business dimension.

Figure 1 presents pictures from the three cases under analysis.

Figure 1: Short food supply chains as social innovation: Case studies in Lisbon Metropolitan Area

Table 1: SFSC and social innovation

	Oeste farm	Mimosa farm	Green Baskets
Activities	Market of producers Baskets	Market of producers plus conventional retail outlets Baskets	Baskets
Main features	Producers/consumers linkage Local economy (local and seasonal products) Producers network – with a complementary nature Environmental concerns (organic production) E-commerce/digitalization	Producers/consumers linkage Local economy (local and seasonal products), complemented with imported produces, and distribution orientation Producers network – stimulated and technically supported by Quinta da Mimosa Environmental concerns (organic production) E-commerce/digitalization	Producers/consumers linkage Local economy (local and seasonal products) Producers network – central to the philosophy of this CSA initiative Environmental concerns (organic production) E-commerce/digitalization
Territorial Scales	Local/regional	Local/regional/national	Local/regional/national

5. Conclusion

The research on SFSC through the lens of SI based on three case studies located in the Lisbon Metropolitan Area allowed the identification of some central aspects and issues related to this trend in food system transition towards more sustainable models. The SFSC identified correspond to baskets of fresh fruits and vegetables, in the three cases, and in producer's markets, in two cases. In both typologies of SFSC it is possible to acknowledge the critical role played by the network of producers in the supply effort of the initiatives. The supply of fresh vegetables and fruits on a regular basis, that is, weekly, depends on the production of the farms owned by the representatives interviewed, but also on the production of other producers either in a local, regional and, sometimes, national scale. This characteristic involves the dynamization of local economies and, therefore, the development of the territory. It is also possible to conclude with the important role played by e-commerce in the commercialization of the baskets. These are ordered through the internet sites of the enterprise/organization and delivered at home or in pre-defined spots. In one of the cases, we are dealing with a methodology of SFSC that scaled up to all the regions of the Portuguese mainland. All the three cases produce and commercialize organic products, an expression of the ecological and environmental concerns of the three leaders interviewed. These characteristics are related with different, but related, forms of SI in the three pillars of sustainability – economic, social, and environmental. For future research it is important to explore the challenges of the conciliation of the three pillars of the sustainability. It will also be important to further explore the consequences of digitalization in the development of businesses within the food sector. Besides the publication in national and international Journals, and their presentation in conferences, the results of the research can be shared with the initiatives.

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The Influence of Entrepreneurial Intention on New Venture Creation in the African context

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Abstract: This paper analyses the influence of career choice and entrepreneurial intention on new venture creation among African university students. Besides, we explore how the social context may affect new venture creation, taking into account the inner circle of entrepreneurs, the organisational environment and the larger environment. To test our hypotheses, data from the 2018 Global University Entrepreneurial Spirit Students' Survey (GUESSS) were used. We focused on nascent entrepreneurs, who are starting a new business, from Algeria, Sierra Leone and South Africa. Our findings contribute to fill the gap in the literature on the link between entrepreneurial intention and entrepreneurial behaviour, and it is one of the few studies addressed to the entrepreneurial African context.

Keywords: entrepreneurial intention, new business, university students, nascent entrepreneurs, entrepreneurial behaviour

1. Introduction

Nowadays receiving a college degree is no longer a guarantee for future employment, especially in resource-constrained environments (Guiso et al., 2006; Namatovu et al., 2018), and in recent years entrepreneurship gained increased attention. Most of workers in low-income countries and more than a third in lower-middle-income countries are entrepreneurs engaged in self-employment activities (Fields, 2014), and this is particularly relevant in sub-Saharan Africa (Dakung et al., 2017).

Previous studies have investigated the impact of factors such as role models (Laviolette, Lefebvre, & Brunel, 2012), subjective norms (Kolvereid & Isaksen, 2006), personality traits (Rauch & Frese, 2007; Zhao & Seibert, 2006) and entrepreneurial education (Premand, Brodmann, Almeida, Grun, & Barouni, 2016) on students' entrepreneurial initiatives. In addition, most of these studies have been focused on the planned behavior to understand the antecedents and consequents of entrepreneurial behavior (Lee and Wong, 2004).

There is a growing interest to understand the relationship between entrepreneurial intention and new business creation, especially in low and middle-income contexts. The theory of planned behaviour [TPB] (Ajzen, 1991) has been widely applied mainly in studies focused on intentions (Gieure et al., 2019; Lortie and Castiogiovanni, 2015; Fayolle and Liñán, 2014; Gieure et al., 2020). According to Meoli et al. (2020). However, entrepreneurial intention is a necessary criterion to start a business, but is not a sufficient criterion. As an alternative, we based our framework on social cognitive career theory [SCCT] (Lent and Brown, 2013), which allows assessing how social context complements the internal motivations to become entrepreneurial intention into behavior.

Thus, the objective of this paper is to determine the influence of entrepreneurial intentions and career choice intentions on new venture creation in the African context, using a theoretical framework based on SCCT. This framework considers the influence of social context and the influence of university graduates' career choice intentions on their decision of starting a new venture, differentiating the social context in three levels. The first level is represented by the influence of family background. The second level comprises the organizational influences and is associated with the universities where the graduates have studied and where they were faced with a supportive environment of entrepreneurial activities. Finally, the third level, represents society influences, including power distance and subjective norms.

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The proposed framework was tested using data from the 2018 Global University Entrepreneurial Spirit Students' Survey. We have focused on nascent entrepreneurs and university students' career choice intentions right after studies and five years later from Algeria, Sierra Leone and South Africa..

The rest of the paper is organized as follows. Sections 2 and 3 describe the proposed theoretical framework and the research design. Section 4 presents the main results. Finally, section 5 presents the conclusion.

2. Theoretical framework

Our theoretical framework is based on the SCCT (Lent & Brown, 2013; Bandura, 1986), to address how career choice intentions and the social context influence new venture creation among African university students. The SCCT has been used in various researches to study entrepreneurship careers (Hechavarria et al., 2012; Liguori et al., 2018; Liñám & Fayolle, 2015). It takes into account the main components of entrepreneurial intention models (Liguori et al., 2018; Pérez-Lopez et al., 2019).

In SCCT the context influences the relationship between intention and career behavior. Thus, the process in which individuals decide their career choices is not only influenced by intentions but also by favorable environmental conditions or weakened by unfavorable ones. (Lent et al., 2000; Meoli et al., 2020). The SCCT recognizes the direct path between career choice intentions and career choice behavior, and the influence of the environmental context.. Moeli et al. (2020) and Lent et al. (1994) argue that the environmental context of individuals can be represented as a series of concentric circles, such as the immediate social contacts (family, friends and other) and the societal context (organizational and socio-economic).

In Figure 1 is represented the simplified scheme of our theoretical framework, and in the following paragraphs a set of hypotheses on how career choice intentions and different contextual influences can enhance new venture creation are formulated.

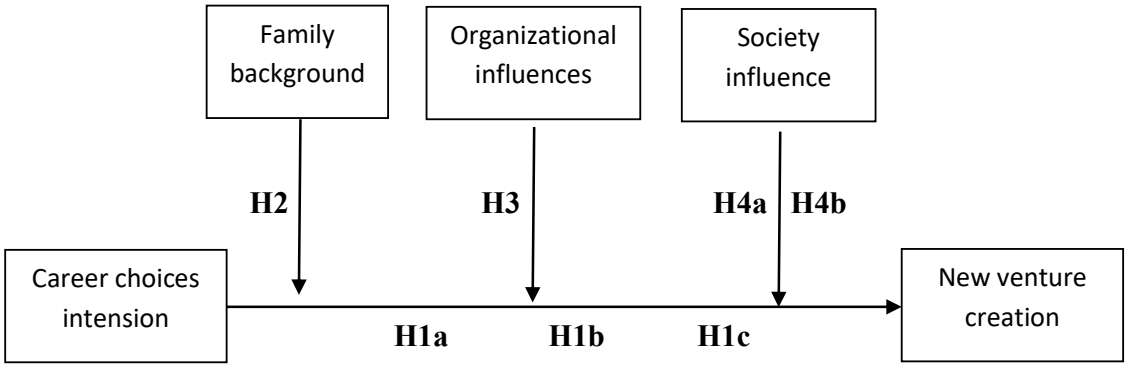

Figure 1: Conceptual model

Given the link between entrepreneurial intentions and new venture creation, the following hypotheses are formulated based on career choice intentions:

> ***H1a*** *– The intention to be a founder positively influences new venture creation;*
>
> ***H1b*** *– The intention to be an employee in an organization negatively influences new venture creation;*
>
> ***H1c*** *– The intention to be a successor in an existing business negatively influences new venture creation;*

Family background belongs to the inner circle of the young entrepreneur's social context, and several studies have shown a significant positive influence of family background on entrepreneurial intentions and activities (Jena, 2020; Pfeifer et al., 2016). Family background also influences career preferences, the development of skills and business behaviors in career related tasks (Pérez Lopez et al., 2019). Therefore, these relationships lead us to formulate the following hypothesis to explore:

> ***H2*** *– Family background positively influences new business creation*

Universities are a source of entrepreneurs among academics and students, and peers have in the long-run influence on career choices including, an entrepreneurial career (Brenoe & Zölitz, 2020; Kacperczyk, 2013). In the African context, universities also play a crucial role in promoting entrepreneurial activitie (Binks et al. 2006; Co & Mitchell, 2006; Dackung et al., 2017). Thus, we hypothesize that:

H3 *– Organizational influences positively influences new business creation*

Among contextual variables, subjective norms, as the perceived social pressure regarding a given behavior, are positively relayed to the core variables of SCCT (Kassean et al., 2015). An individual to become or not become an entrepreneur considers the opinion of important people or groups on his decision (Ajzen, 1991). Thus, as stronger subjective norms regarding entrepreneurship mean stronger intentions and behavior towards entrepreneurship, the following hypothesis is formulated:

H4a *–Subjective norms positively influences new venture creation*

Power distance is another relevant dimension associated with remote social context, which is related to cultural values. Individuals demonstrating a high power distance are respectful to authority and accept an unequal distribution of power, while individuals with a low power distance question authority and want to participate in decisions that affect them. Thus, power distance shows how a society accept power differences and privileges (House et al., 2004). Within the entrepreneurship literature, power distance has shown mixed influences on entrepreneurship (McGrath et al., 1992; Rauch et al., 2013; House et al., 2004) GLOBE study indicates that African countries have the highest preferences for power distance (Thomas, 2015). Thus, we hypothesize:

H4b *– Distance power positively influences new venture creation*

3. Research design

To test the hypotheses proposed in our conceptual model it was used the data from the 2018 Global Spirit Students Survey (GUESSS) project, which covered 54 countries. Our sample is addressed to the participating countries of Africa and includes 4826 students from Algeria, Sierra Leone and South Africa. Regardless of the type of career choice intentions, all students from those countries were selected, and only the observations with no missing values across all variables were considered for analysis, resulting in a final usable sample of 3927.

In our conceptual model the dependent variable is new venture creation. In the GUESSS dataset to capture the nascent entrepreneurs the following question is asked to the students “Are you currently trying to start your own business / to become self-employed?” For the students that are trying to start a new business, the variable is coded as "1" and otherwise is coded as "0".

The independent variables are the career choice intentions and the variables of social context. In the GUESSS dataset career choice intentions are addressed through the following two questions - “Which career path do you intend to pursue right after the completion of your studies”, and “Which career path do you intend to pursue career five years after?” To answer these questions we have aggregated the ten items of the GUESSS dataset into four items, including the following career intentions: 0 - “an employee in an organization”; 1- “an entrepreneur in an own business”; 2 - “a successor in an existing business”; and 3 – “other / do not know yet”.

To characterize the social context, we have considered the following three variables: family background, organizational influences and society influences. These variables were obtained through a Principal Component Analysis (PCA), where we retained the first component with eigenvalues > 1 (Marôco, 2018). Table 1 shows the results of the Principal Components Analysis.

Table 1: Principal component analysis

Components	Mean	S.D.	# of factors retained	Eigen-value	Percent Variance
Family background Component 1:			1	1.784	89.2
Parents self-employed	0.43	0.855			
Parents majority owners of a business	0.35	0.795			
Organizational influence – Component 2:			1	5.139	64.23
University environment	4.10	1.766			
Program learning	4.38	1.714			

Components	Mean	S.D.	# of factors retained	Eigen-value	Percent Variance
Society influence:					
Subjective norms – Component 3	5.01	1.338	1	1.898	31.64
Distance power - Component 4	4.66	1.660	1	2.064	34.41

The second component, organizational influences, is associated with the university environment (Franke & Jüthje, 2004) and program learning (Souitaris et al., 2007). Despite two factors have eigenvalues >1, the component, organizational influences, was operationalized using only one factor. Besides this factor has an eigenvalue (5.139) much higher than the second factor (1.050) and represents 64.23% of the total variance.

Society influences have been represented by two components, which are associated with subjective norms (Liñán & Chen, 2009) and power distance (House et al., 2004). The first principal component has an eigenvalue of 2.064 and retains 34.41% of the total variance, and the second component has an eigenvalue of 1.898 and retains 31.64% of the total variance.

As in other previous studies, we controlled the age, gender, the field of study, the country where students stay, religious preferences and marital status.

4. Results

Table 2 presents the descriptive statistics, and Table 3 the pairwise correlations between the variables considered in our conceptual model.

Table 2: Descriptive statistics

Variables	N		Mean	S.D.	Min	Max	Frequency	
							Categories	Percent
Dependent variables:								
New venture creation	4826		0.43	0.495	0	1	Yes	44.4
							No	55.6
Control variables:								
Age	4443		27.40	8.899	16	59		
Gender	4634		0.63	0.484	0	1	Male	44.6
							Female	55.4
Marital Status	4632		0.43	0.495	0	1	Single or divorced	82.3
							Married or registered partnership	17.7
Country	4826						Algeria	21.8
							Sierra Leone	2.0
							South Africa	76.2
Student full time	4826		0.63	0.484	0	1	No	37.8
							Yes	66.2
Field of study	4723						Business and Economics	19.7
							Natural Sciences and Medicine	38.8
							Social Sciences, Law and Arts	28.3
							Other	13.3
Religion preference	4579						Christianity	54.7
							Islam	25.3
							Other	20.0
Independent variables:								
Career choice intentions after studies:	4826						Employee in an organization	72.8
							Founder in a own business	15.6
							Successor in another business	2.2
							Other / Do not know yet	9.4

Variables	N		Mean	S.D.	Min	Max	Frequency	
Career choice intentions 5 years later:	4826						Employee in an organization	39.5
							Founder in a own business	43.5
							Successor in another business	5.0
							Other / Do not know yet	12.0
Principal components:								
Family background - Component 1	4826		0	1	-0.50	3.35		
Organizational influence – Compon. 2	4479		0	1	-2.08	1.76		
Society influence:								
Component 3 – Power distance	4640		0	1	-3.65	1.84		
Component 4 – Subjective norms	4640		0	1	-3.37	1.72		

As the dependent variable is dichotomous, a logit regression model was specified to analyze the likelihood of a university student create a new venture in Africa. The descriptive analysis, the principal component analysis and the logit regression have been performed with the SPSS software, version 24. Before specifying the logit model, the multicollinearity was tested by analyzing the correlations between the variables of the conceptual model, and by using the variance inflation factor (VIF). For the independent variable of career choice intentions two simulations were done. One considers the career choice intentions right after studies (model 1 and model 2), and the other five years after studies (model 3 and model 4). In both cases, in the first step, we included only the control variables and career choice intentions (model 1 and model 3, and in the second step, we added the variables of the social context (model 2 and model 4).

The pairwise correlations of Table 3 show that the independent variables are weakly correlated between them. The strongest correlation occurs between the variables of religious preferences of Islam and the country Sierra Lione, where the correlation index is -0.814. However, all values of the VIF indicator are well below the cut-off value equal to 5 proposed by Studenmund (1992), guaranteeing that multicollinearity is not a problem.

Table 3: Pairwise correlations

	1.	2.	3.	4.	5.	6.	7.
1. Age	1						
2. Component 1	0.058	1					
3. Component 2	-0.054	.061	1				
4. Component 3	0.002	-.070	-.294	1			
5. Component 4	0.004	-.033	-.028	.001	1		
6. Student full time: No	-0.454	.021	.030	.009	-.037	1	
7. Gender: Male	-0.064	.032	-.071	-.003	.027	-.034	1
8. Country: Sierra Leonne	0.041	.124	.013	.034	-.095	.050	.010
9. Country: Algeria	0.002	.028	-.056	-.021	-.048	.083	-.085
10. Field of study: Bus. and Economics	-0.026	-.087	-.084	.011	-.028	-.015	-.033
11. Field of study: Nat. Sc.and Medicine	0.012	-.083	.041	-.013	-.043	.075	-.101
12. Field of study: Social Sc., L. and Arts	-0.069	-.041	.059	-.026	-.049	.049	-.002
13. Marital status: Single and divorced	0.429	.061	-.008	-.019	.024	.089	.007
14. Religion: Christianity	-0.050	.041	-.094	-.021	.028	-.026	.107
15. Islam	0.018	-.036	-.008	.016	.002	.001	.058
16. Career choice intentions: Employee	0.021	-.017	-.065	-.062	-.011	-.034	.020
17. Career choice intentions: Entrepreneur	-0.044	-.026	-.055	-.053	.006	-.021	.006
18. Career choice intentions: Successor	0.022	-.051	-.067	-.038	-.010	-.042	-.001

	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
8.	1										
9.	.201	1									
10.	-.055	-.024	1								
11.	-.013	.008	.651	1							

					1.	2.	3.	4.	5.	6.	7.
12.	.020	-.007	.613	.697	1						
13.	-.011	-.031	.031	.010	-.010	1					
14.	.010	-.034	.016	.028	.023	.059	1				
15.	-.814	-.184	-.007	.006	.019	.056	.330	1			
16.	.104	-.004	-.062	-.071	-.065	.025	.007	.021	1		
17.	.058	-.076	-.065	-.057	-.055	.024	.031	.027	.731	1	
18.	.032	-.013	-.033	-.021	-.025	.042	-.017	.013	.475	.384	1

Table 4 presents the results obtained for the simulations of our logit model. The coefficients reported in the table are the exponentiated coefficients, this is, the odds ratio (OR), and the respective standard deviation values. In addition, some quality indicators are also presented, as the number of observations, -2 Log-likelihood, Chi and the pseudo R2 of MacFadden's.

In model 1, the significant control variables are gender, country where the students stay, religious preferences and marital status. In gender, males are more likely to become entrepreneurs than females (OR: 1.878 and p<0.01). Regarding the country, students that stay in Sierra Leonne has more likelihood to become an entrepreneur than students from South Africa (OR: 0.510 and p<0.01). The students that stay in Algeria also has more likelihood to become an entrepreneur than students from South Africa (OR: 1.402 and p<0.1), but only at a 10% significance level. Regarding religious preferences, the results show that Christians has more likelihood to start a new venture than students from other religious preferences with a 1% significance level. The marital status, namely the single or divorced has more influence to start new a business than married or registered partnership, being the OR 1.194 at a 10% significance level.

Table 4: Logit model results: New venture creation (0/1)

	Career choice intentions right after studies		Career choice intentions 5 years later	
	Model 1	Model 2	Model 3	Model 4
Age	1.000 (0.005)	1.000 (0.006)	1.014*** (0.005)	1.013*** (0.006)
Gender: Male	1.878*** (0.068)	1.825*** (0.072)	1.939*** (0.068)	1.895*** (0.072)
Country: Sierra Leonne Algeria	0.510*** (0.230) 1.402* (0.184)	0.427*** (0.265) 1.505** (0.199)	0.737 (0.225) 2.042*** (0.186)	0.632 (0.258) 2.181*** (0.201)
Regular work next studies	1.140 (0.086)	1.172* (0.092)	1.079 (0.086)	1.092 (0.092)
Field of study: Business and Economics	1.042 (0.184)	0.972 (0.092)	0.974 (0.117)	0.928 (0.125)
Natural Sciences and Medicine	0.968 (0.104)	0.924 (0,112)	0.972 (0.104)	0.943 (0.112)
Social Sciences, Law and Arts	0.890 (0.108)	0.870 (0.117)	0.910 (0.108)	0.916 (0.118)
Religion: Christianity	1.352*** (0.089)	1.272*** (0.094)	1.300*** (0.089)	1.223** (0.094)
Islam	1.115 (0.183)	1.030 (0.195)	1.036 (0.184)	0.971 (0.197)
Marital status: Single or divorced	1.194* (0.100)	1.184 (0.107)	1.178* (0.101)	1.186* (0.101)
Career choice intentions:				
Employee in an organization	1.824*** (0.123)	1.724*** (0.133)	1.253** (0.115)	1.174 ((0.123)
Entrepreneur in a own business	10.363*** (0.152)	10.284*** (0.164)	4.890*** (0.116)	4.602*** (0.124)
Successor in a existing business	3.514*** (0.240)	1.817*** (0.256)	2.802*** (0.178)	2.524*** (0.926)
Component 1: Family background:		1.065 (0.034)		1.058* (0.039)
Component 2: Organiz. influence:		1.285*** (0.039)		1.263*** (0.039)

	Career choice intentions right after studies		Career choice intentions 5 years later	
Component 3: Power distance		0.922** (0.038)		0.903*** (0.038)
Component 4: Subjective norms		1.104*** (0.036)		1.069* (0.036)
Constant	0.178*** (0.247)	0.206*** (0.266)	0.117*** (0.242)	0.132*** (0.261)
Observations	4305	3927	4305	3927
-2 Log likelihood	5,347.84	4,793.42	5,311.09	4,767.09
Chi	4.768	8.125	8.449	8.324
Pseudo R^2 (MacFadden's)	0.096	0.111	0.103	0.116

Notes: Significance levels * p < 0.1; ** p < 0.05; *** p < 0.01

In model 2, the results for control variables are similar to those obtained in model 1. Some differences exist in the following variables. Students that are staying in Algeria (OR: 1.505 and p<0.05) and students that have regular work after studies (OR: 1.172 and p<0.1) become more influent and more significant than in model 1, and marital status is no longer significant. However, in both models, all career choice options are significant at 1%. The OR in model 1 are 1.824, 10.363 and 3.514 and in model 2, are 1.724, 10.284 and 1.817 for to be an employee in an organization, an entrepreneur in an own business, and a successor in an existing business, respectively. These results support hypothesis H1a, which states that the intention to be a founder positively influences new venture creation. However, they lead to rejecting hypotheses H1b and H1c, which argue that the intention to be an employee in an organization and the intention to be a successor in an existing organization negatively influence new venture creation.

The next step of analysis tested the influences of social context on new venture creation. Contrary to our expectations, the influence of family background on new venture creation is not statistically significant, which leads us to reject hypothesis H2.

The organizational influences have a statistically significant (p<0.01) and positive (OR: 1.285) relationship with new venture creation. It means that as the university environment is more entrepreneurial and programs learning are more important in a perspective of business knowledge, higher is the probability of an individual becomes a founder of his own business. Therefore, these results support hypothesis H3, which states that organizational influences positively influence new venture creation.

As we expected, hypothesis H4a, which argues that subjective norms positively influence new venture creation, is supported at a 1% significance level, and the positive relationship is associated with an OR of 1.104.

Power distance has an OR of 0.922 and a positive influence on new venture creation at a 5% significance level. These results support hypothesis H4b, which states that power distance positively influences new business creation. Thus, in the African context, as the society is more authoritarian, obey leaders without question and the power is concentrated at the top, higher is the probability of a university student becomes a founder of his business.

Model 3 and model 4 assess the influence of career choice intentions five years later finished studies. The influences of control variables are similar to those observed for model 1 and model 2. Regarding the career choice intentions, the results also support hypothesis H1a and lead to rejecting hypotheses H1b and H1c. However, the OR show a lower influence of career choice intentions on new venture creation now than right after studies. The hypotheses related to the positive effects of organizational influences (H3) and distance power (H4b) are supported by the results at a 1% significance level. Concerning subjective norms (Hypothesis H4a), the positive influence is now weaker (OR 1.069), and it is significant only at a 10% level.

5. Conclusion

This study analyzes the influence of career choice intentions and social context on new venture creation. For the social context were considered several circles, which include family background, organizational influences and society influences. This last comprise subjective norms and power distance. The study was addressed to the African context by using data from the 2018 Global University Entrepreneurial Spirit Students' Survey (GUESSS).

The hypotheses were tested through a logit regression model where the new venture creation specified as a dichotomous variable was considered the dependent variable.

The results confirm the positive effect of gender, the country where students stay, religious preferences and marital status on new venture creation. They provide evidence that career choice intentions to be a founder in an own business is a good predictor of new venture creation right after studies and five years later. However, in the African context the intentions to be an employee in an organization and the intention to be a successor in an existing business can be also an antecedent of a founder behavior. The results also showed that family background is not a determinant factor for creating a new venture in the African context. The circle of organizational influence is a significant factor positively affecting new venture creation, which reveals the importance of the university environment and program learning for developing an entrepreneurial culture. Regarding society influences, both subjective norms and power distance have a positive effect on new venture creation.

This study contributes to understanding the link between intentions and behaviors, provides a framework that gives a career perspective of the entrepreneurial behavior and is one the few studies that explores entrepreneurship and career choice intentions in the African context. It has implications for different actors. For researchers, the results confirm that distinguishing two levels of analysis as career choice intentions and social context is important to understand how individuals transform their career choice intentions into venture creation. In addition, our results should be interesting for universities and policymakers that need to keep creating favorable conditions for developing entrepreneurial processes.

Our study has also several limitations that open new research perspectives. For instance, the role of the family in a career choice as an entrepreneur is not only limited to family background. Further studies should also explore society influences and include variables associated with the regional socio-economic dynamics. The study is addressed to the African context, but the sample from the GUESSS database only covers three countries. Another limitation is that it is a cross-section study and does allow to identify the dynamics of the development process of career choices. However, despite these limitations, we show that the choice of starting a new venture in the African context is affected by the intentions and by the social context.

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The Relation Between Consumer Green Behavior, Sustainable Packaging, and Brand Image in the Purchase of Ecological Wines

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Abstract: This research work focuses on studying the relation between the consumer green behavior and sustainable packaging, taking the brand image into consideration: Do these elements impact the purchase intention for ecological wines? Nowadays, consumers show a high level of concern for the environment and the positive impact of the products in the market. Likewise, the consumer attitude significantly affects the intention of purchase and, thus, the selection of brands that follow the green trend. Therefore, more serious efforts are required in the implementation of eco-friendly packaging, as the package serves important functions that need to be considered. It includes various elements that play a crucial role, such as design and its purposes, the material, and the production process. On the other hand, sustainable practices are increasingly appreciated by different agri-food sectors, such as the wine industry. This industry is starting to provide a specific symbol for the products considered less detrimental to the environment, according to the sustainability criteria. Consumers usually consider the wine quality to be higher if sustainable practices are being used, even if the customers do not completely understand such practices. Within this framework, this research work becomes crucial to provide an academic support for the Latin-American region, as several of the studies focused on the relation between sustainable packaging and the purchase intention for ecological wines are based on developed countries.

Keywords: green behavior, sustainable packaging, consumer behavior, eco-friendly packaging, ecological wine

1. Introduction

Nowadays, consumers show a high level of concern for the environment and the positive impact of the products in the market (Groening et al., 2018). Likewise, the consumer attitude significantly affects the intention of purchase and, thus, the selection of brands that follow the green trend (Han et al., 2009). In that sense, the so-called green products appear, offering an eco-friendly content or packaging to reduce the environmental impact (Vazifehdoust et al., 2013).

On the other hand, the green product has different crucial dimensions that need to be considered. One of these dimensions is the packaging and its purpose as a means of communication that directly affects brand popularity (Prakash & Pathak, 2016). As packaging is the first thing that consumers notice before making a purchase, it gives them the chance to analyze the content characteristics and if these are aligned to the product (Yang & Zhao, 2019). They are changing their behavior to coexist with the environment. Thus, this change affects the purchase decisions based on products that fulfill their needs and their impact on the sustainable environment (Barnet, 2010). Besides, consumers are willing to pay a higher price for eco-friendly products (Flores, 2018). In this scenario, wine is an important and competitive industry that it's always looking for the attention from market savvy consumers (Galbreath, 2015). Wine industry is being tested as consumers are increasingly aware of the environmental consequences caused by the products they buy, showing a significant interest in sustainable wines (Sogari et al., 2017).

This research work focuses on studying the relation between the consumer green behavior, sustainable packaging, and the brand image, analyzing their impact on the purchase intention for ecological wines in Peru. Therefore, this research work becomes crucial to provide an academic support for the Latin-American region, as several of the studies focused on the relation between sustainable packaging and the purchase intention for ecological wines are based on developed countries.

2. Literature review

2.1 Consumer green behavior

Nowadays, excessive consumption creates a significant environmental impact that endangers the environment, and which, in turn, increases the purchase of green products to lessen such impact (Liobikiene & Bernatoniene,

2017). They are increasingly aware of the impact that their consumption has in the environment, and they try to change their attitudes and behavior for the benefit of the environment and future generations (Urien & Kilbourne, 2011). The consumer behavior makes them look for high-quality recyclable products, which have eco-friendly labels, and reduce the consumption of resources and energy (doPaço et al., 2018).

2.1.1 Attitude

This shows that the purchase intention, attitudes, personal rules, willingness to pay, and environmental concerns have a positive effect in the perception of the sustainable behavior (Robinot & Giannelloni, 2009). Non-recyclable plastic containers have created a negative attitude in consumers towards the usefulness of these products. However, there is a solid theoretical contribution regarding the consumer's response to sustainable packaging, as most of the studies conducted in the Western world analyze the purchase background of the green product consumers (Koenig-Lewis et al., 2014).

***H2**: The green consumer attitude impacts positively on the purchase intention.*

***H4**: The green consumer attitude impacts positively on the sustainable packaging.*

2.1.2 Environmental concern

Environmental concern refers to the concern of consumers for the current environmental issues, and that they are determined to make efforts to reduce such issues (Dunlap & Michelson, 2002). These people are willing to buy products with green packaging, as this shows their concern for the environment (Prakash & Pathak, 2016).

***H3:** Environmental concern impacts positively on the purchase intention.*

***H5:** Environmental concern impacts positively on sustainable packaging.*

2.2 Green product and its characteristics

A green product must be produced using recyclable materials, which are energy efficient and cause the lower environmental pollution possible, in comparison to traditional products (Borin, 2011).

Green characteristics in a sustainable product indicate credibility values for the consumers (Taufique et al., 2016). Some of the characteristics of this type of product are packaging, quality, design, brand image, among others (Chen, 2001).

2.2.1 Sustainable packaging and its elements

Packaging plays an important role in the packing consumption markets, as they greatly depend on characteristics to keep the product quality, prevent any type of loss, and offer a differentiation in the market (Steenis et al., 2017). Within an eco-friendly approach, green packaging must be taken into account to reduce the product's ecological footprint (Krah, Todorovic, & Magnier, 2019).

Green packaging presents various dimensions that are considered into its design: shape, color, label, and graphic and verbal features (Magnier & Schoormans, 2015).

H1: Environmental packaging impacts positively on the purchase intention.

Ecolabel is a transparent mean for consumers to know that the products are less harmful to the environment; it also helps them to analyze the impact of such products in the environment from the points of sale (Thøgersen et al., 2010). Companies use eco-friendly labels with certifications to promote the purchase of their green products, providing customers with a clear message that guarantees that these are sustainable products (Testa et al., 2015).

The materials required for a green product are usually less than the ones for a traditional product; in addition, these materials are recyclable, natural or biodegradable, and present a design that may be reused in the future (Dangelico & Pontrandolfo, 2010). Materials such as glass are considered eco-friendly, as it is made of natural resources, it may be recycled, and it does not lose its functions, even after several recycling rounds (Singh & Pandey, 2018).

2.3 Brand image

A key aspect for brands is the image they project to consumers, as it helps them to create concepts and associations (Chen et al., 2017). Consumers deem important to find brands that express their identity; this even impacts on the purchase frequency and their brand loyalty (Chen et al., 2017).

There are some key factors that impact on the wine industry's brand image, such as wine quality and regional differentiation (Balestrini & Gamble, 2006). This reinforces the idea that wines that enjoy a good brand image are prone to be selected due to the influence of geographical factors (Aranda et al., 2015). Therefore, it is important for the wine producing areas to be constantly developing marketing strategies to support the brand image (Bruwer & Johnson, 2010).

H6: *Wine brand image has a positive impact on the purchase intention.*

H7: *The ecolabel has a positive impact on the brand image.*

2.4 Purchase intention for green products

Intention is a conscious plan made by a person who shows a defined behavior, including a behavior for the purchase of some product or service. (Batista Ferraz, 2017). Therefore, the purchase intention for eco-friendly products may be defined as the actions made by a consumer for purchasing items that have been produced using green materials and processes, causing less damage to the environment (Ali & Ahmad, 2016). Nowadays, the consumer's purchase decisions are based on different factors, and considering the packaging impact on the environmental issue is one of them (Prakash & Pathak, 2017).

2.5 Research model

This study presents an analytical descriptive research work that aims at identifying the relations among variables using a research model based on two previous research projects. Variables such as environmental concern and attitude were taken from the research model of Prakash and Pathak (2016), which seeks to identify how these variables impact on the consumers' purchase intention. This study showed the attitude and personal norms had a positive influence in the intention to purchase a sustainable packaging. Also, it revealed a new insight in relation to eco friendly packaging adding concepts such as willingness to pay and environmental concern. The third variable is eco-friendly packaging, taken from the research model of Yanti Budiasih (2018), to identify its impact on attitude, environmental concern, and purchase intention.

In this way, the model was obtained with the help of the papers mentioned before. The model created has three main variables such as consumer green behavior, including attitude and environmental concern, which it's believed has a great impact in the decision of the person, due to the awareness of the impact that their consumption has in the environment, and they try to change their attitudes and behavior for the benefit of the environment and future generations (Urien & Kilbourne, 2011). On the other hand, sustainable packaging is one of the most relevant when it is referred to ecological topics, because it is one of the characteristics of a product that must be taken into account to reduce the product's ecological footprint (Krah, Todorovic, & Magnier, 2019).

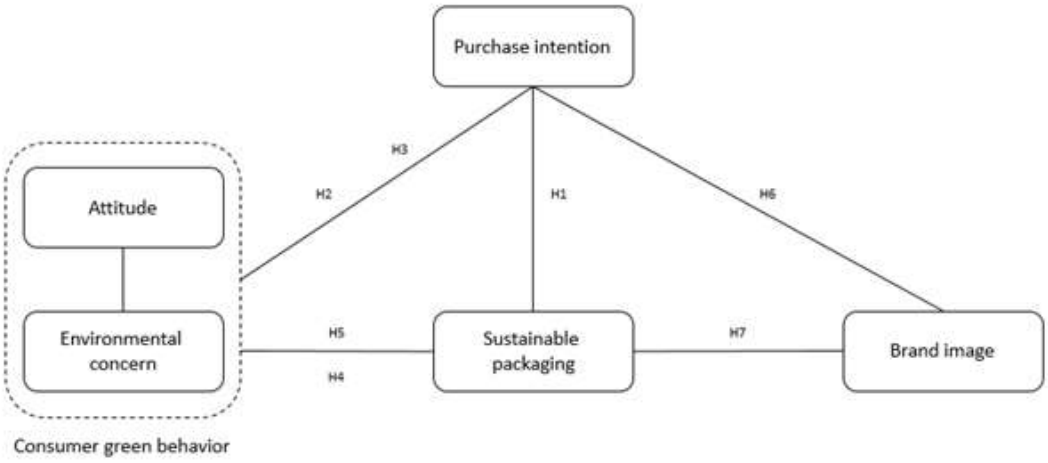

Figure 1: Research model. Source: Developed by author

3. Methods

This academic research has a positive correlational type, with a quantitative and conclusive approach. The selection of the sample was based on a non-probabilistic selection with individuals chosen for convenience and based on wine consumption criteria, age and ecological attitudes.

Information will be collected through a 5-section questionnaire. The first part will present filter questions for the respondents. The next sections will serve to study in depth the elements developed in this research, such as the consumer behavior and environmental concern, from the work of Prakash and Pathak (2016); sustainable packaging, from the work of Budiasih (2018); and purchase intention, which will apply questions from two above-mentioned papers on ecological wines. These elements will be measured using Likert scales, with ranges from 1 to 5, 1 meaning "totally disagree" and 5 meaning "totally agree." The survey was shared in social media, where our audience may be found.

The 450-person sample used to collect information involves millennials located in Metropolitan Lima. Also known as Generation Y, it includes people between 20 and 38 years of age (Naderi & Van Steenburg, 2017). The survey will present 5 large filter questions, such as place of residence, age, previous purchase of any eco-friendly product, wine consumption, and willingness to buy ecological wines.

To analyze this questionnaire, bivariate correlations were used to identify the link between the study's variables and the strongest relations between them; this element was also taken also from the paper of Prakash & Pathak (2016).

4. Results

The elements of sustainable packaging—such as material, ecolabel and design—were related to the purchase intention for ecological wine, applying bivariate correlations. Based on the analysis, a significant positive relation exists between recycled materials and purchase (Pearson = 0,515). On the other hand, consumers consider sustainable packaging elements, such as design (media = 4,62) and ecolabel (media = 4,53), as less relevant, based on the low score in the applied correlations.

Packaging elements considered as significant by previous research works, are not presenting a package as eco-friendly, according to the results of this survey. It is inferred that all products in the market include the label data, and that design—even if considered as innovative and trendy—is not as relevant as the material of the product, the ecological wine in this case.

The relation between sustainable packaging and purchase intention (h2, h3) is based on the theory that explains the connection between consumers and packaging, and how one of its elements becomes attractive for the shopper. Each packaging element must be carefully analyzed and present a production line with a clear message, to be attractive for the consumer. In this case, wine is purchased due to its eco-friendly packaging, which impacts on the purchase intention. Therefore, the consumer's approach to the product is according to one of the sustainable packaging elements, and the proposed hypothesis is partially confirmed.

Table 1: Summary of results between sustainable packaging and purchase intention. Source: Developed by author

Sustainable Packaging -> Purchase intention	Pearson
Environmentally friendly packaging wine	*0,464*
Wine material (recyclable or reusable)	*0,515*
Ecological wine with reusable materials	*0,540*
Easy to understand eco-label	*0,481*
Precise eco-label information	*0,458*

4.1 The green consumer attitude impact

A large part of the consumers in the survey agreed on the characteristics of the consumer green behavior, and that they show an eco-friendly trend in relation to various products. However, the applied correlation shows

that, even if the green awareness is present, there is no relation to a potential purchase intention for ecological wines.

The data shows that consumers would buy products that are not harmful to the environment, including an ecological wine (Pearson = 0,449), and they would be, eventually, willing to buy products made of recycled materials (Pearson = 0,419). However, even if the wine presents all the characteristics and production elements of a green product, it belongs to the alcoholic beverage category, which is not of high priority for consumers.

Therefore, the hypothesis on the relation between the variables of green consumer attitude and positive impact on the purchase intention for ecological wines is rejected.

The variables of the green consumer attitude were also analyzed in relation to the sustainable packaging. The correlation application proved that most of the respondents do not consider sustainable packaging as a main feature of green products (Pearson = 0,405). This aspect shows that green products—wine in this case—may present other main features to impact on the consumer attitude, such as the production (media = 4,34) or the brand background.

These variables do not present any relation, which does not have a superficial interest significance from the green consumers, particularly for products such as ecological wine. Therefore, the relation is considered as null, and the hypothesis (H5) is rejected.

4.2 Environmental concern impact

The bivariate correlation analysis showed that there is no direct relation between environmental concern and purchase intention for ecological wines. Most of the respondents present a consumer green behavior. However, the purchase intention for an alcoholic beverage shows a low relation to environmental concern (Pearson = 0,305).

Concern in these consumers is of a macro nature and not so specifically defined, or—at least—they have not generated a concern directed towards the alcoholic beverage category, particularly wines. Nevertheless, 89% of people change products for eco-friendly ones, showing their environmental awareness when purchasing goods.

The lack of relation between variables shows that the target audience would not consider this market niche as a priority in Peru. Therefore, the hypothesis is rejected.

Based on the results shown by the correlation between the environmental concern and sustainable packaging variables, there is a weak relation between the environmental concern dimension and aspects such as if consumers had changed traditional products for others in eco-friendly packaging (Pearson = -0,264) or had refused to buy a well-known product if it is not eco-friendly and it does not come in a sustainable package (Pearson = 0,292). The survey results showed an approximate media of 4,40 for environmental concern. The exact same situation is found for sustainable packaging, presenting an approximate media of 4,50, which means that respondents agree on the fact that the product they want to purchase should come in an eco-friendly packaging.

Unlike the work of Prakash and Pathak (2016)—who state that the respondents in their study are willing to buy products in an eco-friendly package, showing their environmental concern—the findings of the present research work indicate that the survey respondents do not consider all elements mentioned as an important part of their green behavior. Sustainable packaging would not be a main aspect for them when concerning about the environment. Therefore, this hypothesis is rejected.

4.3 The impact of the wine brand image

In relation to the brand image, a significant relation was evidenced with the purchase intention, focused on the fact that the consumers would buy an eco-friendly version of the product if the wine brand sold one (Pearson = 0,508). It is highly likely that this group of people is not thinking about the price, taste, and other similar aspects, as much as of the brand that may guarantee a high quality wine, and, in some cases, may provide status. This idea is reinforced by this variable's media of 4,60, indicating that people totally agree on drinking their preferred

brand wine that is eco-friendly. As Chen et al. (2017) stated, consumers deem important to find brands that express their identity; this even impacts on the purchase frequency and their brand loyalty.

Table 2: Summary of results between green consumer behavior and purchase intention. Source: Developed by author

Consumer Green Behavior -> Purchase Intention	Pearson
Efforts to purchase products with recycled materials	*0,419*
Change of products for environmental reasons	*-0,258*
Purchase of products less harmful to the environment	*0,449*
Option to purchase products with biodegradable materials	*0,486*
Purchase of recycled products	*0,362*
Purchase of environmental products from unknown brands	*0,437*

On the other hand, some dimensions of the brand image—such as the type of wine (Pearson = -0,105)—and aspects of the products—such as the harvest, taste or scope (Pearson = 0,048)—are the weakest elements in the relation between brand image and purchase intention. This suggests that the consumers do not find these elements as important for the purchase decision, as they may feel safer considering the brand than the place of origin or the type of harvest of the product. Even though there is a balance between the relations of the variable's elements, it should be mentioned that the hypothesis is confirmed.

Table 3: Summary of results between brand image and purchase intention. Source: Developed by author

Brand Image-> Purchase Intention	Pearson
Type of wine consumed	*-0,105*
Relevant factor for buying wine	*0,168*
Purchase of preferred brand green wine	*0,508*

Regarding the results obtained by the relation between the ecolabel and the brand image, the first one presents a very high relation to the type of wine being consumed, whether foreign or national (Pearson = 0,979). This element definitely helps people to obtain all the information they are looking for when selecting a product, and will serve them to understand that the wine they are purchasing is eco-friendly, also providing them with all the information required in a label.

Likewise, the ecolabel was found to have a strong relation to relevant factors taken into account when purchasing a product (Pearson = 0,693). The most important aspects for the survey respondents are the brand (43,3%) and the place of origin (35,3%). Considering the above mentioned, the proposed hypothesis is confirmed, as the respondents consider as important aspects the information about the wine, as well as its environmental approach. In this study, these variables are considered to reinforce the idea that people are interested to contribute towards the environment protection.

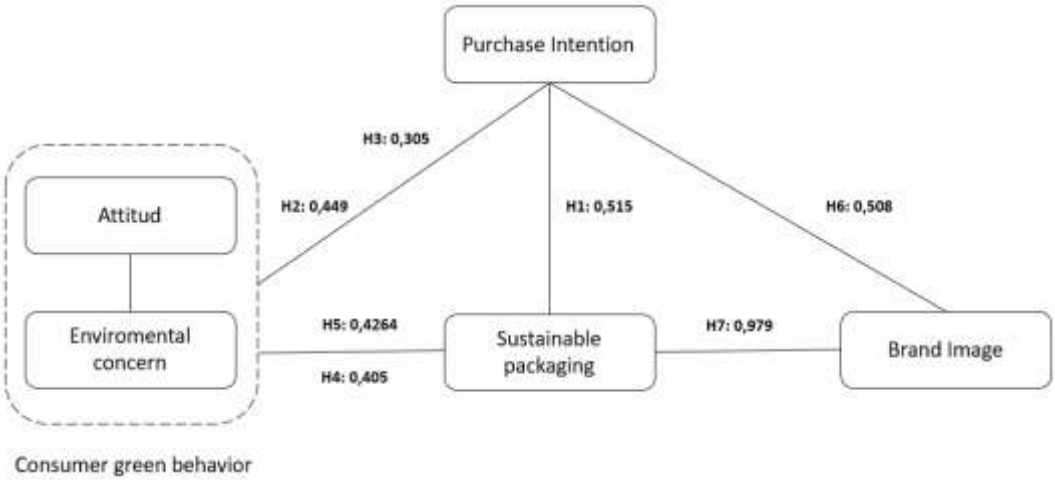

Figure 2: Correlations applied in the research model. Source: Developed by author

5. Conclusions

This research work focuses on studying the relation between the consumer green behavior and sustainable packaging, taking the brand image into consideration, as well as the impact on the purchase intention for ecological wines. The study has concluded that the proposed relation is moderately strong. It is inferred that this is mainly due to factors in the Peruvian market, and that this category has an ecological by-product, which continues to be a niche for the Peruvian case. Along that same line, the sustainable packaging and brand image variables are the ones that present a fairly strong relation to the purchase intention. The strongest aspects in these variables were the packaging material and brand.

The brand image, along with the brand dimension, is the strongest variable in the entire study, being the most relevant one when purchasing an ecological wine. The brand helps consumers to be sure that they are buying a high quality product. This will eventually define the election and purchase of the ecological wine, due to the importance of its ecological actions.

Regarding material, the survey respondents consider important that the ecological wine packaging is made of recycled materials, as they would be helping to reduce the environmental damage when buying this product. It is inferred that the eco-friendly packaging material is the most important aspect, as it is the first feature that the consumer notices in the point of sale. Therefore, the shopper may realize that the packaging material could be reused, after consuming the product. Even though the ecological wine material may be considered as recyclable and reusable, this may change if a brand decides to change its traditional packaging material—the glass—for other considered as superior for its ecological benefits.

Contrary to the initial expectation, the consumer green behavior variable could not be related to the purchase intention. This does not mean that the survey respondents are not concerned for the environment or do not have a green attitude. On the contrary, the findings suggest that people consider other relevant green actions or products, and that buying ecological wines is not part of their priorities when contributing to the environment.

The limitations that arose during the research were, the global pandemic due to COVID-19 and the turn it unleashed against consumption outside of basic needs. Which does not include wine as an essential product in the home, limiting the development of paper in its entirety.

The scientific contribution of this research on organic packaging is the analysis of the organic wine category and the importance of branding to develop confidence. Due to the fact that the ecological wine market is still a niche in Peru consumer green behavior is not strong enough to motivate it's consumers. In addition, future research on categories with a stronger presence in the Peruvian ecological market may be conducted, obtaining a greater level of detail of the relations between the variables proposed in this research.

On the other hand, it is important that companies focus on the brand image and the ecological purchase intention, as image is one of the strongest and most relevant variables in this research. Therefore, marketing strategies must continue to be developed, to allow the brands to enter into the Peruvian market with ecological themes, as a strength in branding, understanding the most important factors taken into consideration by customers when buying an eco-friendly product.

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'Towards HEInnovate 2.0': From Assessment to Action

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Abstract: Entrepreneurship in higher education is now recognised as important and as a major driver to underpin innovation. It can be seen as an organisational response to external challenges and pressures (Gibb and Hannon, 2006) and as an appropriate response to succeeding in highly turbulent and unpredictable environments. Furthermore, the role of the entrepreneurial university is increasingly being seen as important for finding new ways to compete and succeed in uncertain and unpredictable environments and for finding new solutions to the multiple challenges that need to be addressed for the public good (Hannon, 2020). The aim of this paper is to give an insight into a new initiative *'Towards HEInnovate 2.0'*: From assessment to action". *THEI2.0* is a five country, EU-funded study under ERASMUS+ (Forward Looking Cooperation Projects in the fields of Education and Training), designed to enhance the use and impact of the EC-OECD's *HEInnovate* tool across Europe. The project team includes representatives from Portugal, Ireland, Germany, Spain and Finland. The project is grounded in HEInnovate, an initiative of the European Commission's Teaching, Education and Culture, in partnership with OECD Local and Economic Development Programme. The aim of THE2.0 is to develop a model to support users in translating the HEInnovative self-assessment results into actions to implement in their own institutions. In doing so, the project will help HEIs to become more entrepreneurial. It will develop an increased and improved version of the HEInnovate tool with the aim of offering its user a set of new features. This augmented version aims to support decision-making processes of Higher Education Institutions, in their various fields of intervention, in order to make them more entrepreneurial, above all allowing greater involvement, participation and communication by the people who define them. This study will seek to find out who takes responsibility within HEIs for managing the tool; which specific dimensions of the tool they are focusing on; what types of actions are being implemented as a result, and how effective the tool is from the HEI's perspective. The study will be of value to academics, entrepreneurs and policy makers in the space.

Keywords: entrepreneurship, innovation, higher education, HEInnovate

1. Introduction

Gibb (2013) offered a useful working definition of entrepreneurial higher education institutions as:

> *"Entrepreneurial higher education institutions are designed to empower staff and students to demonstrate enterprise, innovation and creativity in research, teaching and pursuit and use of knowledge across boundaries. They contribute effectively to the enhancement of learning in a societal environment characterised by high levels of uncertainty and complexity and they are dedicated to creating public value via a process of open engagement, mutual learning, discovery and exchange with all stakeholders in society - local, national and international."*

The adequacy of the definition in the current reality worldwide reinforces the urgency of HEIs to foster and thrive in a pandemic, and future post-pandemic society. To overcome the disruptive challenges due to COVID-19, HEIs allied in a deep and effective collaboration within the community, promoting real knowledge exchange and collaboration with stakeholders, described as fundamental by Gibb and Hannon (2006) as "*can be seen as an organizational response to external challenges and pressures*". Moreover, it is expected nowadays that HEIs must produce entrepreneurial capital and be catalysts for regional economic and societal development, taking on significant roles in entrepreneurial ecosystems (Stolze and Sailer, 2020). There are key challenges faced by HEIs such as fundamental changes in the production of knowledge, reorganizing education, a key-element

currently with the abrupt change to distance emergency learning, enhancing graduate employability and supporting and preparing entrepreneurs and building partnerships, which stands as pillars for nowadays' urgencies faced worldwide (Gibb, Hofer and Klofsten, 2015).

Hofer and Baur (2018) suggest that HEIs need to be themselves entrepreneurial to effectively support entrepreneurship development namely about the perception and organization of their activities in the field of education, research and involvement within the HEI particularly considering staff incentives, professional development and resource allocation. HEInnovate is fully described as the reference instrument to identify and catalyse further actions and strategies and used in the country reviews conducted in Ireland and Hungary.

Davey, Hannon and Penaluna (2016) also address the topic by questioning how the higher education institution "*can contribute through education, entrepreneurial support and network functions and be entrepreneurial in its endeavours have lacked academic focus and rigour, particularly in relation to fostering entrepreneurial mind-sets*". Evidenced by the current worldwide situation of the importance of innovative and entrepreneurial HEIs to foster and thrive in challenging scenarios, the utilization of self-reflection instruments as HEInnovate stands as a reference, guidance and reliable way to support academies in capitalizing their potential and links with society.

2. Background

THEI2.0 project (*Towards HEInnovate 2.0: From Assessment to Action*) enhances the HEInnovate self-reflection tool by adding features for decision-making support and actions created. *THEI2.0* takes the outputs of HEInnovate and, based on them, supports the user onto the next step, the suggestion of real actions.

Being successfully used for self-reflection and diagnostics, HEInnovate gives users an idea about their roadmap for the future (Hofer and Kaffka, 2018; Ruskovaara and Pihkala, 2016; Henry, 2015). The ambition of the *THEI2.0* project is that users start relying on HEInnovate not only for self-assessment and diagnosis but, also for next steps such as actions and strategic planning.

Doing so, THEI2.0 will be able to point to achievable and contextualized actions, transferable to reality, either personal, institutional or external. In a nutshell, *THEI2.0* helps building an integrated version of HEInnovate, forward-looking from the self-assessment phase, by adding features for decision-making and helping to take real actions.

Starting from the HEInnovate diagnostic stage, *THEI2.0* project makes possible the alignment between self-assessment and actions, based on the strategic goals of the users. As a result, *THEI2.0* will increase the motivation for innovation and the awareness of changing higher education systems aligned to the current challenges in education and society. The subsequent Outcomes from *THEI2.0* will then reinforce the power of HEInnovate as a vehicle for organisational change and innovation.

The consortium partners are experienced in intensively using HEInnovate and communicating their experiences to distinct audiences. Reported in case studies, user stories and publications, these experiences help building a collaborative R&D effort, consolidated by the implementation of pilots that provide robustness, credibility and diversity. Such a richness of information can, in the future, lead to improved versions of the HEInnovate tool, supported by European Commission and the OECD.

The concept behind THEI2.0 have the following unique features:

- **Valorisation**: *THEI2.0* outputs will reach the community through several channels in order to achieve the maximum impact on higher education systems, adding more resources to those currently present in the HEInnovate tool.
- **Support**: *THEI2.*0 will deploy a framework to help users of HEInnovate to create actions aligned to their priorities, making it possible to infer about their impact in short-, medium- and long-term scenarios.
- **Recognition:** A set of digital badges (rewards) is proposed, reinforcing not only HEInnovate as it is, but particularly promoting the follow-up stages as actions.
- **Guidance:** Elaboration of guidelines for a widespread use of HEInnovate and THEI2.0.

- **Improvement:** Recommendations for improvements of the HEInnovate tool, grounded in the new innovative approaches.

THEI2.0 project assumes three premises:

- **1. Effective Engagement of all Stakeholders as a Key Element in Achieving Goals**

In the last decades, a great effort was developed to increase the relationship between HEIs and industry/business sectors and also with each other. Examples at the highest level, are the series of University-Business Forums (Brussels), the University-Industry Interaction Conferences and the University-Industry Innovation Network, consolidated by a number of publications (Salleha and Omar, 2013), (Sendogdu and Diken, 2013), (Ankrah and AL-Tabbaa, 2015), (Banu et al., 2016), (Ivascu, Cirjaliua and Draghicia 2016). In (Gabriel et al., 2018), a model for the effective engagement of stakeholders in engineering education is presented, with a consolidated pilot implementation in (António Andrade-Campos et al, 2018). The methodology was based on the three A's (AAA): (1) *Acquisition* (A); (2) *Analysis* (AA); and (3) *Action* (AAA), those now being the pillars of *THEI2.0*, and implemented by a sequence of stages distributed over time. Each aspect of interest is first considered during *Acquisition* (A), focusing on its expectations and aims, followed by the *Analysis* (AA) stage, providing a deeper insight into the acquired data. In *THEI2.0*, the acquisition stage comes directly from HEInnovate (Gabriel et al., 2018). The *Action* (AAA) stage then follows, leading to the global outputs of the approach. The first two levels of engagement are fully active, with cross-connections between stakeholders already working together.

- **2. Scouting as a Support for Decision Making**

Scouting stands as a successful process for the analysis and translation into actions, supporting decision-making processes (Heinz, Yannic, Herbert and Gillig, 2017; Rohrbeck, 2010). Value creation by relationships between stakeholders is crucial for contextualized and effective actions, aligned with their aims and objectives. Scouting of early-stage technologies has been investigated within open innovation (Holzmann, Sailer, Galbraith & Katzy, 2014) as well as between consortium members and associate partners in a successfully proved way.

- **3. Recognition and Rewarding Effects**

Recognition and rewarding are particularly important in increasing HEInnovate usage for policy reform in HEI entrepreneurship and innovation. The effect coming from public recognition and awards is already proven (Schögler, 2015), the attribution of badges leading to impact in motivating users, with visible effects in game's context (Van Roy, Deterding and Zaman, 2018; Subhash & Cudney, 2018). In (Luís Pedro et al., 2015) a badging system is introduced to create a more participatory learning community, and another example is the Digital Badge in Entrepreneurship Education at DkIT (HEInnovate Case Study, 2017). Digital badges in *THEI2.0* will give value and recognition to both THEI2.0 and HEInnovate users when aligning self-assessment results to the creation of actions.

3. Aims and objectives of THEI2.0

Project THEI2.0 has two major goals. The primary one is to support users of the HEInnovate self-reflection tool in an integrated and contextualized way. THEI2.0 users will be offered a comprehensive augmented framework of HEInnovate that can guide and align their goals towards proper recommended actions, leading to real impact for themselves and their Higher Education Institutions. The implementation of the proposed methodology will lead to a deep analysis and understanding of HEInnovate results and their translation into actions.

Secondly, *THEI2.0* aims to promote an increase in the number of HEIs that use self-reflection tools in helping with organisational and strategic changes, bringing them towards modernisation and thriving in a post-pandemic society. The use of such tools - particularly HEInnovate - for innovation and entrepreneurship represents a crucial instrument in creating the strategy of the HEI, capitalising on their resources, and, subsequently increasing their potential real impact and influence in their community.

Having these two goals as pillars, *THEI2.0* project has a major general objective and two interrelated objectives, originated from the primary one. The major general objective is defined by the development of a model to support the policy reform in the HEI sector, by using THEI2.0, grounded in HEInnovate. The idea is to create an augmented framework that, when applied to the current structure of HEInnovate, and results coming this tool, will help users to more easily create actions.

This goal is achieved by drawing on the experience of all the members of the consortium that already implemented HEInnovate to develop the model and to build the framework. Also, the implementation of pilots directly coming from the developed model will promote the utilization of THEI2.0 and HEInnovate. The application of the pilots to case studies from consortium members will provide the needed calibration of the framework. The pilots can be tested for robustness and comprehensive features by considering distinct realities in HEI typology, geographic location and dynamics, as well as goals and strategies.

THEI2.0 outputs will be obtained to improve the potential for impact of HEInnovate. Among these, there are: guidelines for support of THEI2.0 users; recommendations for improvements on HEInnovate, maximizing its potential towards action; and a system of rewards through the development of THEI2.0 digital badges. These outcomes will motivate and recognize the effort and dedication of users, in the mission of innovation and modernisation of Higher Education Institutions.

With a cohesive consortium composed of five partners, Dundalk Institute of Technology (Ireland), LUT University (Finland), Strascheg Center for Entrepreneurship (Germany), Tecnocampus (Spain) and University of Aveiro (Portugal), the THEI2.0 team has the common mission of contributing to the improvement of higher education institutions and promoting policy reform of higher education. The diversity of countries and HEIs typologies enriches and empowers the potential of the project, reinforcing the trans-national cooperation as a key-element for excellence of the R&D conducted and real impact.

Starting with HEInnovate as a basis for work, *THEI2.0* project provides the users with a consolidated database for actions, helping institutions to pursue and accomplish the core mission of a Higher Education Institution: providing students with the best competencies to be better professionals and, more importantly, better citizens. With an evidence-based nature, grounded in R&D and piloting, *THEI2.0* project will offer an integrated HEInnovate that will legitimize and substantiate further innovative practices and policies. The utilization of HEInnovate as the pillar of *THEI2.0* project, and the development of an integrated framework, reinforces this tool as an important instrument for innovation in the higher education system.

4. Expected outcomes of THEI2.0

THEI2.0 project intends to transfer the following results to European policy development:

- 1. A model that supports HEInnovate users in translating results from self-assessment into real actions, in the short, medium and long term. The THEI2.0 model will be implemented in five different countries (from the consortium partners), with the integration of different competences.
- 2. Guidelines for users, helping translate HEInnovate results into actions aligned with their aims, leading to a higher potential of that self-reflection tool. The aim is that Higher Education Institutions will use HEInnovate to facilitate the creation of actions for policy reform of Higher Education systems.
- 3. Digital badges for the recognition of users' engagement in using HEInnovate and moving forward to the actions' creation. This enables and fosters the implementation of strategic plans and actions from HEInnovate results, aligned with the specific challenges of the HEI, reinforcing the effective collaboration and interaction.
- 4. Recommendations for the improvement of HEInnovate as a consolidated self-reflection tool, and its valorisation as a relevant way for supporting policy change and adaptation of HEIs to a rapidly changing society.
- 5. A webpage for *THEI2.0* project with updated information of the project aims, objectives and highlighting the evolution and the accomplishment of the defined milestones, deliverables and practical outputs. Events promoting face-to-face contacts will be disseminated and widely communicated, as well as support material for users aiming to use HEInnovate with its augmented features coming from the project.
- 6. A comprehensive set of dissemination outputs that are sustained beyond the timeframe of the project including; podcasts, webinars, e-book of cases studies, conference and journal articles.

THEI2.0 project is based on the conviction that the transfer of these outcomes can effectively improve European policy for change in Higher Education systems. *THEI2.0* can contribute to effective research-integrated self-assessment tools for higher education policy reform and interaction in Europe by promoting and reinforcing dialogues with policy makers and other stakeholders of the higher education system and using their insights and inputs for the enrichment of the results and outcomes of the project.

5. Transferability is based on four specific strategies

- **1**. Promotion of research-based, integrated self-assessment tools for the policy reform in the HEI sector. The first transfer of *THEI2.0* project focuses on the validation of the developed framework, implemented in the five countries of the consortium partners. Based on HEInnovate, the THEI2.0 model validation relies on mutual learning and accumulated experience of the consortium, reflected on past case studies from the consortium members. Based on this experience and the perceived impact from their utilization of HEInnovate, communication and dissemination actions can be carried out in the beginning of the project. Piloting the developed framework for the existing case studies will lead to its validation, before calling for new users and the development of case studies. At that stage, the associated partners will play their role, together with the consortium members, spreading *THEI2*.0 to other entities dedicated to the development of Higher Education policies.
- **2**. Involvement and active participation in the European debate of Modernisation and Transformation of the Higher Education System. With an effective role in (and for) innovation in Higher Education system of the persons and teams that composes the consortium, the improvement of transferability to European policy is guaranteed, particularly through the effort and involvement in the debates about higher education system change. In 2017, the European Commission published the Renewed EU agenda for higher education identifying four key goals for the European cooperation in higher education: "*1. Tackling future skills mismatches and promoting excellence in skills development, 2. Building inclusive and connected higher education systems, 3. Ensuring higher education institutions contribute to innovation and 4. Supporting effective and efficient higher education systems.*"

THEI2.0 project will focus on "ensuring higher education institutions contribute to innovation" and in "supporting effective and efficient higher education systems" by "building inclusive and connected higher education systems" by means of the diversity of the partners of the consortium.

Additionally, facing a pandemic world, aligned with the European Commission, September 2020 (COM (2020) 625 final) "on achieving the European Education Area by 2025", entrepreneurship is one of the key competences to be addressed as fundamental for innovation and entrepreneurship, particularly in Higher Education and to help the sector thrive in a post-pandemic society.

- **3**. Sharing, comparing and gathering different experiences of the five case studies in Europe, using HEInnovate, representing the diversity in the HEI's typology, dynamics, geographical location, aims and strategic plans for innovation and entrepreneurship. Additionally, the R&D capacity of the members of the consortium, the experience-based regarding HEInnovate can provide evidence and added-value for the development of frameworks of integrated self-assessment tools, a set of digital badges for recognition of engagement in distinct contexts, reflecting the diversity of realities in Europe but reinforcing the richness in innovation scenarios and its impact in European policy in Higher Education.
- **4**. Five "positioning systems" that reflect the entity's reality, its dynamic and context at the regional and national level, besides the European one. The experience-based inputs are crucial as they reflect the reality of the institution integrated into the community where it belongs, also aligned with the National priorities of each of the five countries involved. Naturally, the dialogue and dissemination of the outcomes and deliverables will be deepened, benefiting all parts and promoting the optimization of the current collaborations. The implementation of pilots with (and by) new users will spread widely the utilization of HEInnovate and promote a wider awareness of the challenges at local, regional and national level. This will help to identify any needs for actions, change or adjustment.

6. Conclusions and looking forward to the sustainability of the project

The project "Towards HEInnovate 2.0: From assessment to action" (THEI2.0) will develop an increased and improved version of the HEInnovate tool, developed by the European Commission and OECD, with the aim of offering the HEInnovate user a set of new features. This augmented version aims to support decision making by the decision makers of Higher Education Institutions, in their various fields of intervention, in order to make them more innovative and entrepreneurial, above all allowing greater involvement, participation and communication by the people who define them. The project aims to move forward in the decision-making process, translating HEInnovate self-assessment results into actions with real, measurable and contextualized impact in HEIs and, consequently, in the society.

The project promotes the application of actions towards a more entrepreneurial and innovative institution. Users of the tool can enhance their motivation and impact within their institutions. The outputs of the project will benefit from a word-of-mouth effect and promotion either through inner campus dialogues and outer communication with other HEIs and stakeholders.

Going forward, the expansion of the HEInnovate reach is closely related to the ability to provide content and guidelines for policy reform and evolution. The transferability and exploitation of the project relies on the ability to share the main conclusions and procedures with others, both future users of the platform and policy makers through European cooperation at both policy and practice levels. The project is based on the conviction that the transfer of these outcomes can effectively improve European policy for change in Higher Education systems.

The project is based on the principle that the transfer of all these outcomes can effectively improve European policy for change in Higher Education systems. *THEI2.0* can contribute to effective research-integrated self-assessment tools for higher education policy reform and interaction in Europe by promoting and reinforcing dialogues with decision policy makers and other stakeholders of higher education system and using their insights and inputs for the enrichment of the results and outcomes of the project. Additionally, the take up of the digital badges by HEIs will help to ensure sustainability of the project's dissemination.

A final assessment of impact will be presented through a report at the end of the project. This will provide the results of (measurable) impact indicators, correlation analysis with the different activities, and summarizing best practices for impact enhancement aligned with the improvement of innovative actions in the fields of education and training. This will also include a detailed prediction of the impact beyond the project, with a detailed classification of short and long term impact activities, building a projection of the HEInnovate evolution with the inclusion of guidelines and innovative strategies developed over the lifetime of the project. The transferability and exploitation of *THEI2.0* is closely related to the ability of sharing the main conclusions and procedures with others, be it future (new and recurring) users of the platform or policy makers for the future, through European cooperation at both policy and practice levels.

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The Impact of Leadership on Dynamic Capabilities in Chinese Start-Ups

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Abstract: In China, start-ups have become a strong force promoting economic development and technology break through. Leadership is therefore critically important for these new ventures' dynamic capability (DC), or the ability to adapt to the changing environment while seeking for development. This study aims to examine the impact of leadership on dynamic capabilities in start-ups. This is achieved through understanding 1) the leadership attributes and roles of Chinese entrepreneurs and the challenges they face and 2) how their leadership influences their strategies to deal with the challenges and maintain development. The study used the work by Gupta, MacMillan and Surie (2004) as a theoretical guidance and categorized leadership into 5 roles (i.e., framing the challenge, path clearing, building commitment, absorbing uncertainty, and specifying limits), with each role comprising 3 to 4 attributes. A total of 15 entrepreneurs representing different industries and from different cities in China were selected to participate in semi-structured interviews. Findings suggested that framing the challenge was a most popular leadership role possessed by the entrepreneurs in the study. In addition, different leadership roles have varied degree of influence on start-ups' DC. Findings of this study have broad implications for theory, research, and practices. The use of the framework extended our understanding on the impact of leadership on dynamic capability among Chinese start-ups.

Keywords: start-ups, entrepreneurship, dynamic capabilities, leadership

1. Introduction and background

The global economic market tends to be quite dynamic and turbulent in 21st century. The dynamic external environment, such as the acceleration of global competition, quick innovation of technology and individualization and diversification of customer demand, impels enterprises to cope with the challenges in a fast and precise manner. As the newly emerging economic force, start-ups play a significant role in the market, but also confront more such challenges. According to the 2016 annual report of state administration for industry and commerce of China, there are more than 87 million market participants in China, with an average of 151,000 newly registered enterprises per day and 11.6% higher than the previous year. Those new ventures are regarded as new blood to promote the development of domestic economy.

Due to the changeable environment and pressure from mature companies, start-ups have to address several issues to survive, such as resource shortage, imperfect organizational structure and low risk resistance capacity. However, excessive pursuit of new technology and knowledge in start-ups is apt to fall into "Innovation Trap" (Levinthal and March, 1993). Meanwhile, over reliance on the existing technology and knowledge is easy to fall into the "Capacity Trap" (Armstrong and Collopy, 1996). How these start-ups obtain competitive advantages and maintain the long-term competitiveness in this dynamic environment is a crucial issue. Therefore, Teece and other scholars (1997) proposed the theory of DC which get rid of the static equilibrium model restrictions of resource-based view and put forward the new understandings on the DC in entrepreneurship in 2007, emphasizing the importance of DC in the survival and development of new ventures. This concept has been broadly accepted, that is, "integration" and "reconstruction" are the core of DC, which requires enterprises to always maintain dynamic consistency with the external environment, so that they can constantly adapt to changes in the external environment and manage other aspects of the process (Collis, 1994).

In practical terms, the leaders or founders of the start-ups are more vital to their survival and development compared with the mature companies. The surroundings of new ventures impel entrepreneurs to allocate the limited resources and develop business strategies more discreetly and wisely to lead the enterprises to survive longer. Thus, examining the impact of leadership on DC in start-ups is both necessary and important.

2. Literature review

2.1 Dynamic capabilities in start-ups

Teece (1997) and Eisenhardt and Martin (2000) has categorized dynamic capabilities into three general dimensions: 1) the ability of sensing opportunities and threatens (Sensing), 2) the ability of seizing the opportunity to realize it (Seizing), and 3) the ability to maintain a competitive advantage in the long run (Reconfiguring) (Teece, 2007). Another school of thoughts were led by Catherine L. Wang and Pervaiz K. Ahmed, who held the view that although different enterprises have some similarities in dynamic capabilities, these similarities have not been systematically identified. Hence the dynamic capabilities should include the ability to absorb, adapt and innovate, and then gradually develop into the ability to absorb and transform (Wang and Ahmed, 2007). Besides, the other schools represented by Protgerou, Caloghirou and Liouskas (Protogerou et al., 2012) pointed out that coordination, study and strategic competitive response are three major dimensions of DC. Therefore, the research on dynamic capability is still developing, which has far-reaching influence in both academic and commercial fields.

On the basis of diverse definitions of dynamic capabilities, most existing researches on DC are based on mature organizations, which have functioning resources and capabilities. Dynamic capabilities are the rational combination and application of these internal and external resources based on mature resources and capabilities to achieve the purpose of adapting to complex surroundings. However, as a new-established organization, the start-ups have the liability of newness, such as resource scarcity, legitimacy scarcity. Their dynamic capabilities, therefore, should not only contain the connotation of integration and reconstruction, but also the content of searching for resources and identifying opportunities for the organization. This viewpoint is supported by scholars. For instance, Teece claims that start-ups should actively seek external opportunities, and entrepreneurial dynamic capabilities should also include opportunity discovery, perception and utilization based on entrepreneurial organizations (Teece, 2007). Corner and Wu defined entrepreneurial dynamic capability as the process of identifying, utilizing, integrating and redefining new venture resources (Corner and Wu, 2012), which coincided with Sarasvathy's view of developing entrepreneurial opportunities (Sarasvathy et al., 2003). Due to the particularity of start-ups, resource-based theory and entrepreneurial opportunity theory jointly constitute the theoretical basis for the study of entrepreneurial dynamic capabilities. Resource-based theory holds that the key to acquiring dynamic capabilities lies in whether an enterprise can acquire and form unique and scarce resources which are different from other enterprises. Enterprises usually form dynamic capabilities adapted to environmental changes on the basis of existing resources and combined with factors including technology, market, products and capital (Barney et al., 2011). Entrepreneurial Opportunity Theory holds that entrepreneurial activities are opportunity-centred and dynamic capabilities mostly depend on the sustainability and accuracy of identifying new entrepreneurial opportunities and exploiting them (Short et al., 2010). From these two theoretical perspectives, the study of entrepreneurial dynamic competence is in fact similar to that of Teece's viewpoints, whose core point is the ability to integrate internal and external resources and capabilities. Therefore, based on the above theoretical analysis, this study holds that the DC of start-ups is the ability to re-integrate and allocate resources on the basis of discovering and identifying resources to continuously identify and develop new entrepreneurship opportunities to cope with market changes in the turbulent environment.

2.2 Leadership in start-ups

Bass suggests that the success or failure of an organization is determined by the leadership behaviors with the proportion from 45% to 65% (Bass, 1985). The management mind-set of leadership affects the information search, interpretation and filtering of enterprises in the first place. As for start-ups, the personal traits of entrepreneur embedded in leadership are one of the most significant determinants besides industry structure, team dynamics, and market environment (Eisenhardt and Schoonhoven, 1990). However, the existing relatively complete research about the mechanism of leadership influencing the performance of start-ups mostly focused on some traditional leaderships, like transactional leadership and transformational leadership (Hmieleski and Ensley, 2007). Nevertheless, many complete researches were discussed under the context of mature organizations so that they could not guide the entrepreneur to lead their new ventures to get sustainable achievement and competitive advantages in this stormy market.

At the end of 1990s, the concept of entrepreneurial leadership emerged as a brand-new category which has the characteristics of both entrepreneur and successful leader. At first, some scholars held the view that

entrepreneurship research is only part of leadership research (Czarniawska-Joerges and Wolff, 1991). But later, more scholars believed that leadership and entrepreneurship have significant differences in trait and behaviour level, which means they are two different concepts (Perren, 2000). But simultaneously they can still cross and merge with each other in a certain degree. For instance, Fernald, Solomon and Tarabishy (2005) compared entrepreneurship and leadership and identified eight common characteristics, and the cross-section was entrepreneurial leadership.

The studies on entrepreneurial leadership are gradually enriched, which can be roughly divided into the following three categories. First, from the view of ability. Ireland, Hitt and Sirmon (2003) considered that the entrepreneurial leadership is a certain ability that can affect others to manage resources strategically. Thornberry (2006) thought that the effective leadership of an entrepreneur should include passion, vision, controlling force and motivating others, together with cognition and development on opportunities. Second, from the view of process. Based the former crossed researches in the field of leadership and entrepreneurship, Renko, etc. (2005) concluded that entrepreneurial leadership is an influencing process which through vision creation and subordinates' commitments to discover and utilize opportunities to realize organizational goals. Third, from the view of behaviour. Gupta, MacMillan and Surie (2004) concluded that entrepreneurial leadership is a behaviour which through creating vision actively to motive subordinates and earn their commitments to make more strategic value for enterprises.

Dimensions	Roles	Attributes
Scenario enactment	Farming the challenge (specifying highly challenging but realistic outcomes for the cast of actors to accomplish)	Performance oriented Ambitious Informed
Scenario enactment	Absorbing uncertainty (taking the burden of responsibility for the future)	Has extra insight Visionary Foresight Confidence builder
Scenario enactment	Path clearing (negotiating opposition and clearing the path for scenario enactment)	Diplomatic Effective Bargainer Convincing Encouraging
Cast enactment	Building commitment (building an inspired common purpose)	Inspirational Enthusiastic Team builder Improvement-oriented
Cast enactment	Specifying limits (building a common understanding and agreement of what can and cannot be done)	Integrator Intellectually stimulating Positive Decisive

Figure 1: 19 attributes underlying the 5 roles of entrepreneurial leadership

Besides the concepts, the dimensional structures of entrepreneurial leadership also develop rapidly. For instance, the scholars Covin and Slevin (2001) summarized six characteristics of entrepreneurial leadership on the basis of mental models of entrepreneur. Similarly, Fernald, etc. (2005) gave the five dimensions of entrepreneurial leadership after summarizing and comparing the characteristics of entrepreneurship and leadership. In addition, relevant research has also been carried out in some developing countries. Combining with the former researches on entrepreneurial leadership, CAI Guang-rong and Tang Ning-yu (2006) proposed eight dimensions of entrepreneurial leadership through the implementation of open questionnaire for senior managers of SMEs in Shanghai area. In our study, the dimension developed by Gupta, MacMillan and Surie (2004) would be employed in the thematic coding analysis. They combined the previous entrepreneurial research and effectiveness of global leadership organizations and behaviours research to propose 2 dimensions, 5 roles and 19 attributes as shown below (Figure 1).

2.3 Leadership and dynamic capabilities in start-ups

From the development stage of an enterprise, there are great differences between start-ups and mature firms, whether in organizational structure or operation mode. The new ventures show obvious "informal" characteristics, that is, they do not have a sound strategic decision-making model, its strategic concept depends on the leader of the enterprise, and the leader has absolute power in enterprise operation and management (Renko et al., 2015). Existing research agrees with this view, as Teece points out in his research that entrepreneurs and their entrepreneurial teams play a more important role in building dynamic capabilities (Teece, 2012). Koryak and other scholars believed that the impact of entrepreneurs on entrepreneurial dynamic

capability is mainly reflected in two aspects: 1) the identification of entrepreneurial opportunities in specific situations, 2) the development of entrepreneurial opportunities on the basis of rational strategy allocation resources. The knowledge and skills of entrepreneurs play a leading role in the formation and development of dynamic capabilities of enterprises (Koryak et al., 2015).

It is clear that although entrepreneurial dynamic capability is a concept of enterprise dimension, its integration and development are formed on the basis of individual entrepreneurs (or entrepreneurial teams) decision-making, and are inseparable from the leadership of entrepreneurs. Therefore, our paper holds that the leadership traits reflected from leaders could influence the development of dynamic capabilities in start-ups in a certain degree, which is also the research gap of prior studies, especially under the context of China. In this cross-level research, according to the research conducted by Teece (2012), the dynamic capabilities in start-ups would be further generally divided into two dimensions:

- *1. Opportunity recognition capability* refers to the ability to identify entrepreneurial opportunities on the basis of identifying and acquiring resources;
- *2. Opportunity development capability* refers to the ability to integrate, allocate and redefine enterprise resources to develop entrepreneurial opportunities.

Combined with Teece's Theory (SSR), opportunity recognition and opportunity development can be understood for three key points. First, perceive unmet needs and resource status. Second, identify the matching status of demand and resources in the market. Third, creatively restructure existing resources or market demand to create new value.

Just as the theoretical and logical analysis on leadership and dynamic capabilities, entrepreneurship links these two concepts in different aspects. Hence, the research would try to find the logical correlations between them. As you can see in Figure 1, there are two dimensions, scenario enactment and cast enactment of leadership. In scenario enactment, framing the challenge means that entrepreneurial leaders enable teams to maximize their capabilities by building challenges. In this role, it is made up of three major attributes, performance-oriented, ambitious and informed. The teams and their capabilities are an internal resource which can be integrated by the leaders to develop more opportunities in entrepreneurial process to facilitate the entrepreneurial dynamic capabilities. In this process, these three attributes are supposed to be revealed by the leaders. Specially, the leader is supposed to focus on the performance, because better performance can make the new ventures survive at first. Being ambitious means the leaders should set high goals and work hard to achieve that. According to this logical routine, the research made the following assumption.

> *Proposition 1a: In entrepreneurial enterprise, the role of framing the challenge can facilitate the dynamic capability of opportunity development through the attributes of performance-oriented, ambitious and informed.*

Besides, building commitment belongs to cast enactment which means entrepreneur leaders need to use team building skills to inspire and shape a high-commitment team, to help the team commit to greater efforts and achieve the vision described by them. This role consists of four attributes, which are inspirational, enthusiastic, team builder and improvement-oriented. "Inspirational" means the leaders can inspire subordinates to be motivated to work hard. "Enthusiastic" means the leaders should demonstrate and impart strong emotions for work. "Team builder" means the leaders are able to induce group members to work together. "Improvement-oriented" means the leaders can seek continuous performance improvement. This is another way to integrate human resource and make full use of them to achieve more developing opportunities.

> *Proposition 1b: In entrepreneurial enterprise, the role of building commitment can facilitate the dynamic capability of opportunity development through the attributes of inspirational, enthusiastic, team builder and improvement-oriented.*

In scenario enactment, another role is path cleaning, which is made up of the attributes of diplomatic, effective bargainer, convincing and encouraging. From this perspective, entrepreneurial leaders need to negotiate with the internal and external environment, address potential resistance, gain support from key internal and external stakeholders, and remove obstacles to achieving their vision. For these four attributes, "diplomatic" means the leaders should be skilled at interpersonal relations and be tactful. "Effective bargainer" means the leaders are able to make transactions with others on favorable terms. "Convincing" means the leaders should have unusual ability to persuade others of their viewpoints. "Encouraging" means the leaders should give courage, confidence,

or hope through reassuring and advising. In this process, the company could overcome several obstacles and gain more support to increase the capability of opportunity development more sufficient.

> *Proposition 1c: In entrepreneurial enterprise, the role of path clearing can facilitate the dynamic capability of opportunity development through the attributes of diplomatic, effective bargainer, convincing and encouraging.*

Meanwhile, the other two roles are thought to be effective on opportunity cognition, one is absorbing uncertainty, and the other is specifying limits. Absorbing uncertainty refers to entrepreneurial leaders need to build a vision, but they must bear the responsibility of failure. This role mainly reflects four attributes, which are has visionary, foresight, confidence builder and have extra insight. Considering the impact of uncertainty, entrepreneurial leaders must build self-confidence and make people around convinced that the vision can be achieved. Specifically, "Visionary" means the leaders can have a vision and imagination of the future. "Foresight" means the leaders can anticipate possible future events. "Confidence builder" means the leaders should instill others with confidence in the subordinates. In this process, the assessment of risk and building of confidence help to accelerate the cognition on opportunities.

> *Proposition 2a: In entrepreneurial enterprise, the role of absorbing uncertainty can facilitate the dynamic capability of opportunity development through the attributes of visionary, foresight, confidence builder and have extra insight.*

Specifying limits implies by decisively articulating constraints, entrepreneurial leaders can recreate subordinates' perception of their own abilities. Moreover, creativity is more easily exploited when constraints are defined. Similarly, this role is mainly composed by the attribute of integrator, intellectually stimulating, positive and decisive. To be detailed, "integrators" mean the leaders should integrate people or things into cohesive, working whole. "Intellectually stimulating" means the leaders should encourage subordinates to use their mind to cognate more development opportunities. Under this circumstance, the capacity of opportunity cognition can be raised greatly.

> *Proposition 2b: In entrepreneurial enterprise, the role of specifying limits can facilitate the dynamic capability of opportunity cognition through the attributes of integrator, intellectually stimulating positive and decisive.*

According to the above propositions, a conceptual model is illustrated (Figure 2). Simultaneously, a qualitative research is conducted to interview several entrepreneurs.

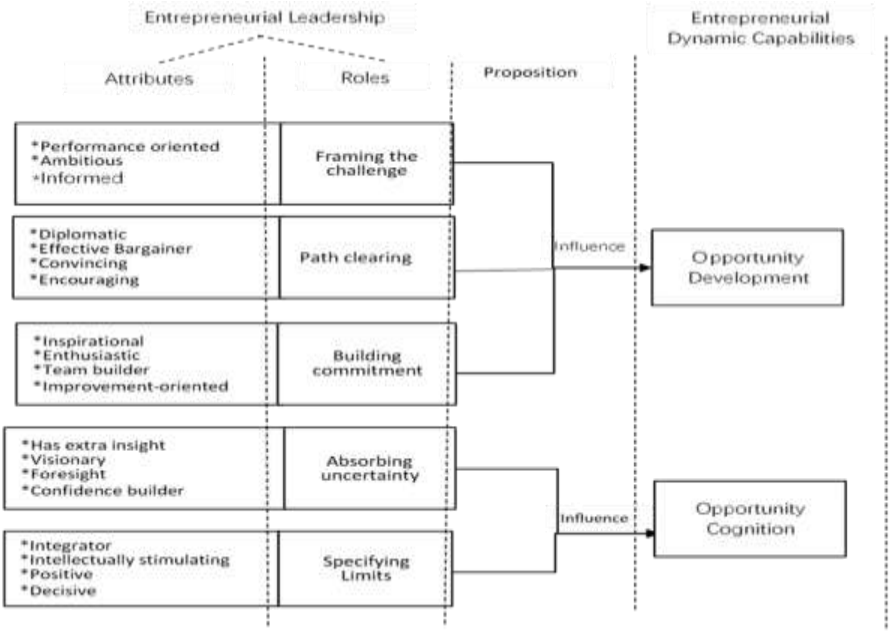

Figure 2: The conceptual model of the study of the influence of leadership on dynamic capabilities in start-ups

3. Methodology

Because our purpose was to explore the impact of leadership on dynamic capabilities in Chinese start-ups, we employed a qualitative approach for multiple reasons. First, qualitative techniques allow for the examination of

topics or concepts via the collection and analysis of detailed information (Creswell, 1998; Patton, 2002). Second, qualitative techniques are most effective for answering how, what, and why questions (Creswell, 1998; Patton, 2002), which are suitable in testing the aforementioned propositions.

4. Data collection

In this research, semi-structured interview is adopted, with each interview lasting for around 60 minutes. The interviewees are 15 entrepreneurs from different industries and cities. Based on the different leadership traits and the dimensions of DC, as well as the particular context of entrepreneurship, we designed 8 questions as shown in the appendix. Specifically, the interviewee would talk about the basic situation and performance about his or her enterprise to give a brief picture at first, including the external market. These questions aim to collect information about the business-building journey, current performance of the enterprise and relevant market situation. Then the mode of communication, behavioral style, and daily routine of the interviewees would be discussed, which aims to identify their leadership traits.

Meanwhile, as the dimension division of DC talked before, the interviewee will be involved to talk about the entrepreneurial process and how they influence the development of the enterprises by different strategies and decisions. The answers can vividly show how the entrepreneurial leaders made different strategies and decisions to influence the entrepreneurial dynamic capabilities, which can also reflect their entrepreneurial leaderships in this process.

5. Analysis

In this section, the detailed thematic coding analysis would be utilized to process the raw data from the interviews to show the initial results of the study. According to figure 2, the 19 attributes belonging to the 5 roles would be coded as the 19 themes, and they would be the scale to further process the interview transcripts and estimate the validity of 5 propositions. First, the entrepreneurial dynamic capabilities which reflect in opportunity cognition and development of the start-ups would be assessed. Second, after the entrepreneurs are asked about their decisions and strategies, together with some other work affairs, the interview transcripts would be processed. As what shown in figure 3 and figure 4, the key words and quotes in the interview will be coded into 19 themes. These 19 themes are named by the initials of 19 attributes underlying 5 roles. For instance, an interviewee talked about his ambitious aim for future development, this will be marked into “Ambitious” (A) & “Framing the challenge” (F) theme, and be abbreviated for F-A, the times that F-A are mentioned will be recorded. Third, the times of 19 themes mentioned by entrepreneurs were recorded in the Figure 5 based on the transcripts. Due to the five roles which are proposed to influence the entrepreneurial dynamic capabilities have different quantities of themes, the research calculated the average value. After rounding off, the value would be recognized as the number of interviewees who showed the certain roles. For instance, as shown in the first row in Figure 4, eight entrepreneurs showed the role of framing the challenge on the opportunity development in entrepreneurship.

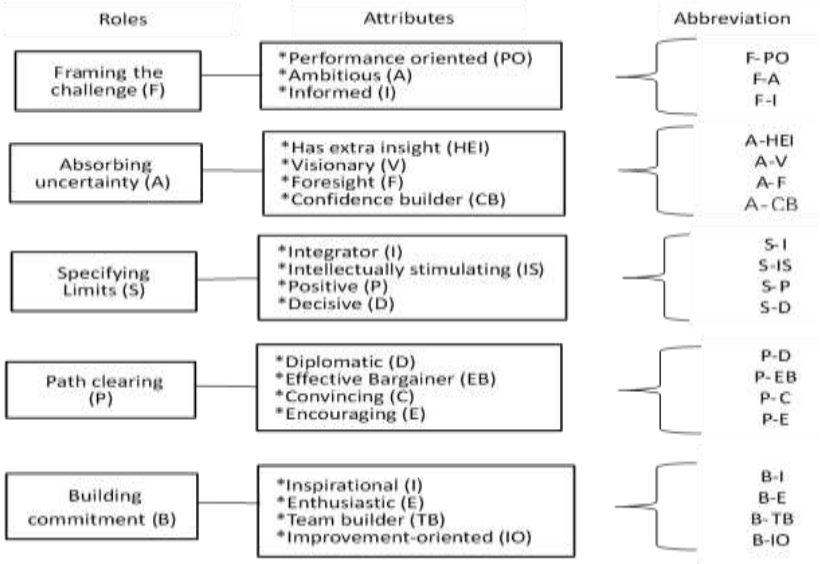

Figure 3: The abbreviation of 19 attributes underlying 5 roles

At least two limitations of this study warrant the attention of readers during the interpretation of our findings. First, along with the market economy, enterprises are constantly changing, in which there will be a lot of interference factors. Our study has not taken these moderating factors into consideration, such as Policy and location. Second, for the reason of exploratory research, the sample size of this study is relatively small. There may be bias or deviation that would affect the findings.

NO.	Data Extract	Coded For	Mentioned times	Average Value	People Mentioned
1	set high standards of performance, focus more on enterprise performance	F-PO	9	8.33	8
2	ambitious, high work goals, work hard to achieve the goals	F-A	7		
3	well-informed, knowledgeable, aware of information in time	F-I	9		
4	Intuitive, have more different understandings on something	A-HEI	6	7.5	8
5	have a vision and imagination of the future	A-V	9		
6	predict or anticipate possible future events	A-F	8		
7	be confident; instill others with confidence	A-CB	7		
8	integrate people or things into cohesive, working whole	S-I	4	4	4
9	encourages others to use their mind; challenges beliefs, stereotypes, and attitudes of others	S-IS	4		
10	generally optimistic and confident on changes	S-P	5		
11	can make decisions and adjustments firmly and rapidly	S-D	3		
12	tactful; skilled at interpersonal relations; manipulative	P-D	5	5.75	6
13	be able to negotiate effectively, able to make transactions with others on favorable terms	P-EB	4		
14	be good at persuading others of his/her viewpoint; persuasive;	P-C	7		
15	give courage, confidence, or hope through reassuring and advising	P-E	7		
16	inspire emotions, beliefs, values and behaviours of others, inspires others to be motivated to work hard	B-I	3	3.25	3
17	out-going; demonstrates and imparts strong positive emotions for work	B-E	2		
18	able to induce group members to work together; be good at activating team members	B-TB	5		
19	pay more attention on improvements; seek continuous performance improvement	B-IO	3		

Figure 4: The process of coding and data handling from the interview

6. Findings

As for the findings of our study, after logical correlations between leadership and dynamic capabilities in start-ups were founded, and five propositions were put forward, the semi-structured interview and thematic coding analysis were employed to verify the propositions. The result verified the influence from leadership on dynamic capabilities in start-ups and also fund different attributes and roles had varying degree of influence.

Concretely, for the opportunity development of entrepreneurial dynamic capabilities, the data suggested that the proposition 1a, 1b and 1c are correct. The roles of framing the challenge, path clearing and building commitments may all have effects on the opportunity development. However, there are some differences in these three roles on the influential degree.

- Compared with other two roles, the role of framing the challenge should be most significant for facilitating the entrepreneurial dynamic capabilities on opportunity development, which was reflected in 8 interviewees. The attributes of being performance-oriented, ambitious and informed are all obviously reflected on the entrepreneurs.
- Then, the influential degree of the role path clearing might be intermediate, and eight interviewees showed this role. The attributes of convincing and encouraging may be more effective in the role of path clearing to facilitate opportunity development.
- Last, the role of building commitment should be the weakest one among these three roles. Only three entrepreneurs showed the roles in opportunity development. Team builder is the most effective attribute in building commitment which reflected by 5 interviewees.

The analysis results are consistent with the content of the interview. For example, Mr. Zheng one of participants made the following comments about his new ventures:

> *"I was one of the best designers in the city, but no matter how good companies I went to, I am still working for others and can't achieve the goal of financial freedom...Although entrepreneurship is a huge challenge for me, the ambitious attitude still inspired me to start my business."*

Another participant, Anna's description of her business also showed her traits and capabilities:

> *"I knew it was a big challenge to start selling green food in a relatively backward area, but I overcame it…Besides, I would even cooperate with my competitors to remove some political obstacles."*

Besides, for the opportunity cognition of entrepreneurial dynamic capabilities, the result of processed data illustrated that the two roles of absorbing uncertainty and specifying limits can also be facilitative. Similarly, there are differences between these two roles of influential degree.

- 1. Eight interviewees showed the role of absorbing uncertainty, which stressed the notable influence. Specifically, visionary and foresight are the two most significant attributes in the role of absorbing uncertainty.
- 2. However, although the role of specifying limits is effective, it is not as strong as the other role. Around four interviewees showed the roles in the opportunity cognition of entrepreneurial dynamic capabilities. Being positive is the most outstanding attribute in the role of specifying limits.

Similarly, one of interviewees, Miss Lan who possessed high opportunity cognition capabilities made the comments:

> *"I am a very curious and determined person. So, when I knew the existence of private cinema, I made up my mind to start one in our region immediately. I even took out a mortgage because the construction and operating costs were very high…The great success of my business proved that I was a visionary female entrepreneur with foresight."*

One of the participants, Sabrina, made such remarks about her We Media career:

> *"As an optimist, I am quite confident that I can sense the trend of fashion…Under the influence of foreign culture, I have long felt that make-up business would become a hit relied on media"*

In summary, the five propositions were verified to be correct under the context, which means the five roles of entrepreneurial leadership may facilitate the development of entrepreneurial dynamic capabilities. Concretely, framing the challenge and absorbing uncertainty should be the two most influential factors for the development of entrepreneurial dynamic capabilities. Path clearing is in the intermediate level. Specifying limits and building commits might have the weakest influence on entrepreneurial dynamic capabilities. For the role of framing the challenge, the attributes of performance-oriented and informed are more reflected on the interviewees than ambitious. For the attributes in the role of absorbing uncertainty, in descending order of influence are visionary, foresight, confidence builder and has extra insight. In the role of path clearing, the attributes of convincing and encouraging are more influential than diplomatic and effective bargainer. As for the role of specifying limits, the attribute of positive is more powerful than integrator, intellectually stimulating and decisive. In the role of building commitment, the attribute of team builder is most influential, which is more than the attributes of inspirational, improvement-oriented and enthusiastic.

7. Significance and future research

Throughout the past relative literature, the research on leadership mostly focused on the individual level, and the research on DC mostly focused on the organization level. Under this circumstance, this cross-level study tried to link these two concepts, not only explained the impact of leadership on dynamic capabilities in the context of entrepreneurship, but also broadens the research scope of both. Besides, the study also has significant implications for management practice. Based on our study, the entrepreneurs can cultivate diverse leadership traits of roles and attributes to facilitate the development of dynamic capabilities to help their start-ups acquire sustainable viability in turbulent environment. As for the future research, our study only discussed the influence from leadership. So, how the dynamic capabilities feedback and influence the development of entrepreneurs' leadership would be another interesting research direction. Besides, the start-up companies are constantly growing and the influence degree of entrepreneurs' leadership may be weakened or strengthened at different stages of development, which would be another topic.

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Do Gender and age Influence Entrepreneurs' Orientation Towards Sustainable Business?

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Abstract: During the last few decades, researchers and policy makers have begun aiming and channeling their attention, efforts and hopes towards sustainable entrepreneurship. Thus, new businesses have increasingly started considering the interests and needs of all involved parties, in order to promote innovation for the development of new products, processes and sustainable working methods. This focus on innovation has contributed to the "creative destruction" of conventional methods, market structures and consumption patterns, whilst also being a source of/for competitive advantage. These concerns bring forth key questions which are necessary to be answered in order to develop a sustainable economy, i.e.: Are people who are concerned with environmental or social issues able to initiate successful (or at least functional) start-ups? Do industrious individuals see sustainability as a factor influencing the success chances of their business? Usually, the common opinion is that entrepreneurs endowed with high human capital are more involved in green entrepreneurship, but there is consistent empirical evidence that points to the fact that many successful "green" projects combine social involvement, the desire to make the world a better and cleaner place whilst maximizing profit and profit goals. In this paper, by using data from a survey-based research among a considerable number of start-ups from around the world, which was made available by the Entrepreneurship Database Program (EDP), we have analyzed the connections between sustainable impact, age and gender of entrepreneurs. We have found a relatively low intention of new, ambitious business owners to focus on sustainable areas, and if they do focus on such areas, this interest is focused towards sectors that can provide them with a consistent and immediate return (e.g. waste management). In terms of gender and age, it seems that women and middle-aged individuals are more in favor of focusing on sustainability and environmental protection issues.

Keywords: sustainable impact area, entrepreneurs, age, gender, accelerators

1. Introduction

Entrepreneurship, together with newly developed, high growth and dynamic businesses can make an important contribution aimed at achieving the sustainability goals of the contemporary world. This can be done by overcoming the superficial, declarative phases of involvement in the goals of sustainable development and by acknowledging the fact that the contribution of the business sector to the substantial growth of global wealth has been achieved at the expense of increased inequalities and of the damages brought to the environment, climate change and depletion of resources (United Nations, 2015). The profound changes in the transparency, innovation and responsibility of new businesses must be followed and guided by the provision of resources and involvement, through public and private structures aimed at supporting nascent businesses with high growth potential, through support offered by business angels, business incubators, cooperation spaces or hybrid systems.

The success of start-ups, when referred to from the standpoint of sustainability, is an important theme in business literature and practice. Thus, in the field of social and ecological entrepreneurship, several factors contribute to the overall success of businesses, namely: the social network of the entrepreneur, team dedication, specific managerial experience and expertise, access to finance, public legitimacy, the efforts undertaken by volunteers, cooperation with stakeholders and market availability (Sharir and Lerner, 2006; (Weber and Kratzer, 2013), technological literacy and experience (durable energy, clean technologies), the relationship with partners and investors (Hatos et al., 2015).

For a long period of time, sustainability and economical returns have been assumed as being incompatible, and as being a main source for challenging the existence of social entrepreneurship (environmental, social, etc.). One step at a time though, sustainable entrepreneurship has started earning the trust of the business community, and it is therefore now considered as being a key factor for business success and innovation, a source for

competitive advantage of present and future projects (Weidinger, 2014), and it acts as an important strategic decision which will ensure economic growth, in a world marked by challenges, threats and recurrent crises.

The question arises whether people who are concerned about environmental or social issues are more likely to initiate start-ups, or, conversely, if people with business initiatives are more likely to succeed in their (sustainable) business? The answer to this question opens the door to both the role and importance of education (formal, sustainable, entrepreneurial) and support structures, both being a necessary catalyst to/for sustainable development.

Also, researchers and policy makers want to understand what motivates individuals to engage in sustainable entrepreneurial activities, or, in other words, why some entrepreneurs are more concerned and active in the ecological and/or social aspects of their business as compared to others. Thus, a series of driving factors of sustainable entrepreneurship have been identified, which act both on individuals and on the business itself. Among them we can mention the following: inner principles or concerns about social and/or environmental issues or the desire for self-employment in sustainable activities (as internal factors), market failures (seen as opportunities for new businesses), social networks, capital, public acceptance (as external factors) (Hockerts and Wüstenhagen, 2010; Bianchi and Noci, 1998).

In this paper, we have attempted to provide an answer to the following question: Is there a connection between the characteristics of entrepreneurship and the orientation of businesses towards sustainable domains? In this regard, we have used the results of a survey involving a large number of entrepreneurs from all over the world, entrepreneurs who have applied to various business accelerator programs. Thus, the paper has been structured as follows: after the introduction on the context and motivations of our research, we have continued with a review of international literature on the determinants and motivations related to sustainable business of entrepreneurs, as well as the role of accelerators and incubators in stimulating entrepreneurial achievement and firm growth. Afterwards, our focus has been placed upon the research methodology, and the analysis and the interpretation of the results. In the end, we have drawn conclusions and have offered several recommendations on economic policies, and we have stated the limitations of our study and possible research directions.

2. Literature review

Regarding the *age* indicator, Stephan et al. (2015), Vecchione et al. (2015), Badulescu et al. (2015), Jahanshahi et al. (2017) state that younger individuals are more in favor of social and environmental entrepreneurship, and that with age (through the passing of time), we will notice a decrease of involvement from entrepreneurs and businesses aimed at bringing improvements in the fields of social and environmental entrepreneurship (Lepoutre, et al., 2013). In contrast, Estrin et al. (2013) have found a positive effect of age upon social entrepreneurship activities. According to them, this occurs given that older individuals have a higher chance of having children, and thus, are more sensitive and perceptive to the environmental conditions of future generations. Thus, older individuals tend to be more inclined or more in favor of engaging in social entrepreneurship activities.

According to Rosa et al. (1996), Boden and Nucci (2000) and Badulescu (2010), *gender* differences play a key role, especially during the launch and survival stages of a business, and this has a major influence upon general experience and expertise, performance and motivation of entrepreneurs. Cowling and Taylor (2001) have stated that female entrepreneurs are better educated, whereas male entrepreneurs possess a better perspective in regard to business survival and development, and that these considerations can surely apply to sustainable businesses. Generally, literature reveals that when conventional entrepreneurship is concerned, male entrepreneurs greatly outnumber female entrepreneurs, whereas green or ecological entrepreneurship is dominated by female entrepreneurs (Malach-Pines and Schwartz, 2008; (Shinnar, et al., 2012). Outsios and Farooqi (2017) consider female entrepreneurs involved in sustainable businesses as being “experienced in vocational business skills and affluent in professional experiences” (p. 195), having faith and trust in their respective abilities, and being successful in managing and balancing business and family, in a very dynamic and difficult environment. Davidson and Freudenberg (1996), and Zelezny et al. (2000) claim that females are more preoccupied by the environment than their male counterparts; this could be explained in part by differences as concerns socialization and networking habits, family roles, and concern for the future environmental wellbeing of their children. Braun (2010) notes that women have stronger environmental attitudes and commitments than

men, which suggests that women entrepreneurs may be more involved in environmental issues than male entrepreneurs. Bord and O´Connor (1997) show that if gender differences towards the environment really do exist, they can be associated to "differences in perceived vulnerability to risks from the environment, not necessarily differences in ecological sensibilities" (p. 830), and that the situation and status quo of female entrepreneurs from poor or developing countries is much more different than that of female entrepreneurs from developed countries. The lack of resources, the financial constraints, the strong impact of climate change, imprint different sustainable entrepreneurship attitudes upon female entrepreneurs. In a study on young (student) entrepreneurs from Indonesia, Sudyasjayanti (2017), has not found a gender difference as regards ecological or environmental entrepreneurship, even though the motivations and interests for this type of entrepreneurship are not identical for the two gender groups, and Sumathi et al. (2014), in a study on green entrepreneurship in India, has claimed that female entrepreneurs show a greater interest, are more assertive, and develop more opportunities for promoting environmentally friendly actions and activities, despite the challenges they are faced with.

As mentioned before, the dynamism of new businesses, sustainable or not, is strongly linked to the reform and transformation of the entrepreneurial ecosystem, and more precisely, to the support structures of start-ups with high growth potential such as business angels, business incubators, coworking spaces or hybrid systems (Cohen, 2013; European Union/OECD, 2019). Originally launched in dynamic and innovation-generating business centers in developed countries, the network of business accelerators has gradually expanded worldwide. The role of accelerators is focused on education, mentoring and financing, the selected companies being introduced in this process for a relatively short period of time, and usually as part of a group of companies (Hathaway, 2016). Business Accelerators not only provide direct or indirect financial support for launching start-ups, but also support services to achieve faster and more thoroughly the overall business objectives, support innovation, encourage new business ideas and promote them on the market, aid in the digital transformation and point towards the modern approach to the challenges of contemporary society (I-DEV International, Aspen Network of Development Entrepreneurs, Agora Partnerships, 2014; Dempwol, et al., 2014; Madaleno, et al., 2018). Mentoring and exposure to the experiences of accomplished and seasoned entrepreneurs represent not only a chance to enter networks that propel them to high business levels, but also a chance to become more attractive and to generate more attention. The educational value of accelerators is real and probably comes from the intensive learning environment which it promotes.

3. Methodology

Our research is based on the data series made available by the Entrepreneurship Database Program (EDP) housed at Emory University, which also includes application data collected from programs that opened applications in the 2013-2018 window. The 2018 Year-End Data Summary report contains data from 19,418 ventures whose founders applied through more than 280 different programs run by more than 90 different organizations (Entrepreneurship Database Program & Aspen Networks of Development Entrepreneurs (EDP), 2019). In this research we try provide answers to the following 3 questions: Is there a connection between the characteristics of entrepreneurship and the orientation of businesses towards sustainable domains? Are younger entrepreneurs more involved (more interested) in sustainable businesses? Does gender really matter in selecting one of the sustainable areas for businesses?

In preparing the dataset of 19,418 entries, we have restricted our analysis to 15,440 for-profit companies (almost 80% of the total). We have also identified and removed 434 records, where firm founders have declared as belonging to age groups either above 75, or below 16, thus reducing the database to 15,006 entries. While such individual values are theoretically plausible, we do consider that it is unlikely that companies/entrepreneurs with these characteristics (not interested in their correct completion) would be suitable for business accelerator programs. We have then excluded another 150 rows with invalid (i.e. blank) gender or age information. Overall, of the total of 19,418 records, 14,856 (76.5%) were considered as valid for our research.

We have considered the answering options for the following question: Which of the following impact objectives does your venture currently seek to address? (check up to three). Thus, out of 29 answering options to the previous question, only 6 options (impact areas) have been selected: Access to clean water; Biodiversity conservation; Natural resources/biodiversity; Pollution prevention and waste management; Sustainable energy/fuel efficiency; Water resource management. These options have been considered as being the most

appropriate to sustainability imperatives, imperatives which have been defined in the "17 Sustainable Development Goals" (United Nations, 2015).

4. Results and discussion

After selecting the 14,856 entries that could be analyzed, we have summarized their environmental-protection impact area (Figure 1), observing that the majority of valid respondents (12,443, representing 84% of the total) have not considered any sustainable impact area/field, 13% have chosen a single impact area, 3% have chosen two areas, and the rest, which make up under 1% of the total, have chosen three, four or five impact areas.

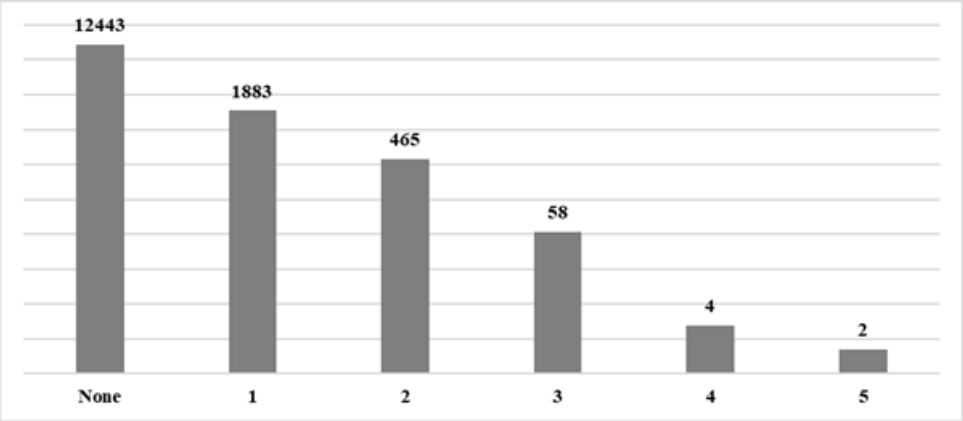

Figure 1: Environmental-protection impact areas

Note: natural logarithms are plotted for readability; actual counts are labelled on chart.

Firstly, we have investigated the existing demographic differences between entrepreneurs interested in one or more environmental impact areas and those who have declared no such areas of interest. On average, entrepreneurs interested in at least one impact area are somewhat older (mean=36.16, median=33) than entrepreneurs who do not declare interest in any impact area (mean=34.43, median=32). The differences are highly significant (Mann-Whitney U test, $p<0.001$). Female entrepreneurs are somewhat (odds ratio=1.22, 95% confidence interval=1.102-1.352) more likely to be interested in environmental protection (one or more impact area) in comparison to male entrepreneurs, as suggested by a highly significant Pearson's chi-squared test ($p<0.001$). In Figure 2, we have analyzed the preferred environmental-protection impact areas, differentiating between companies involved in a single such impact area, and those involved in at least 2 areas. It is readily apparent that biodiversity-related areas/fields are preferred by those in the former category, while the latter are more likely to be involved in water resource management and access to clean water. The differences between the categories are highly significant (Chi-squared test, $\chi2=139.3$, $p<0.0001$), but numerically show relatively similar tendencies.

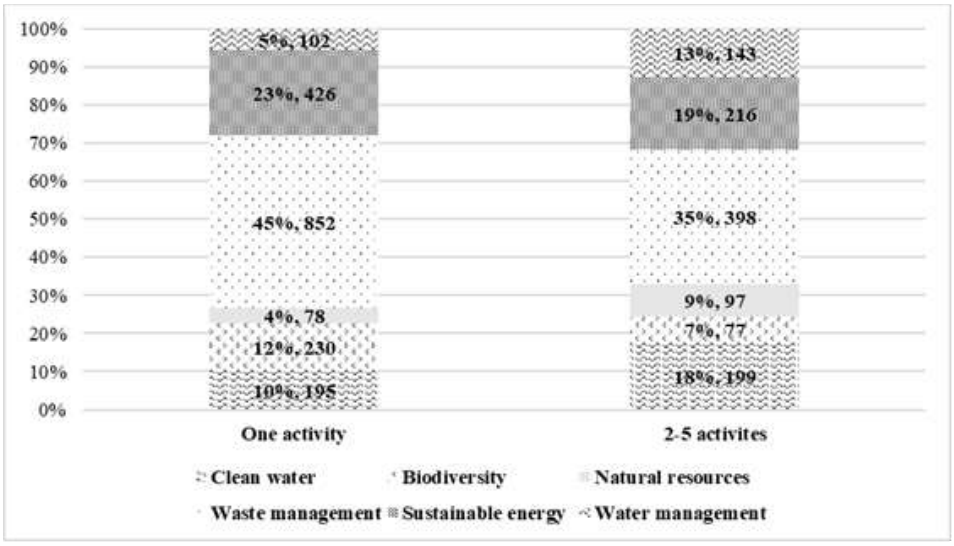

Figure 2: Preferred environmental-protection impact area, by number of activities

We have then analyzed the existence of a relationship between the age of founders and the preferred environmental impact area. The data is not normally distributed or determined by means of the D'Agostino-Pearson normality test. A summary of the statistical data is presented in Table 1. Therefore, we have thus employed the non-parametric Kruskal-Wallis test. Highly significant differences between the median age of founders have been identified (Kruskal-Wallis statistic=26.49, $p<0.0001$). This was followed by Dunn's multiple-comparison test: it was found that the median age of entrepreneurs involved in waste management was significantly lower than that of entrepreneurs interested in access to clean water ($p<0.01$) and natural resource conservation ($p<0.05$).

Table 1: Summary statistics of the age distribution for each impact area

	Clean water	Biodiversity	Natural resources	Waste management	Sustainable energy	Water resource management
Number of values	394	307	175	1250	642	245
Median	36.00	34.00	36.00	33.00	33.00	34.00
Mean	38.09	37.28	38.16	35.56	36.32	36.62
Skewness	0.6973	0.8585	0.8128	0.9296	1.014	1.071
Kurtosis	-0.3663	0.1852	0.1660	0.1399	0.3077	0.5466
Normality test p-value	< 0.0001	< 0.0001	0.0002	< 0.0001	< 0.0001	< 0.0001
Normally distributed	No	No	No	No	No	No

Limiting the analysis to founders that chose at least one area, we have then moved on to analyze whether the gender of founders would lead to the favoring of a certain environmental protection impact area over another. As can be noted from Figure 3, male entrepreneurs are more likely to be interested in water management and sustainable energy, whereas women are more involved in biodiversity and waste management. The differences are highly significant statistically, and regarding the above-mentioned fields, also numerically (Chi-squared test, $\chi 2=41.42$, $p<0.0001$).

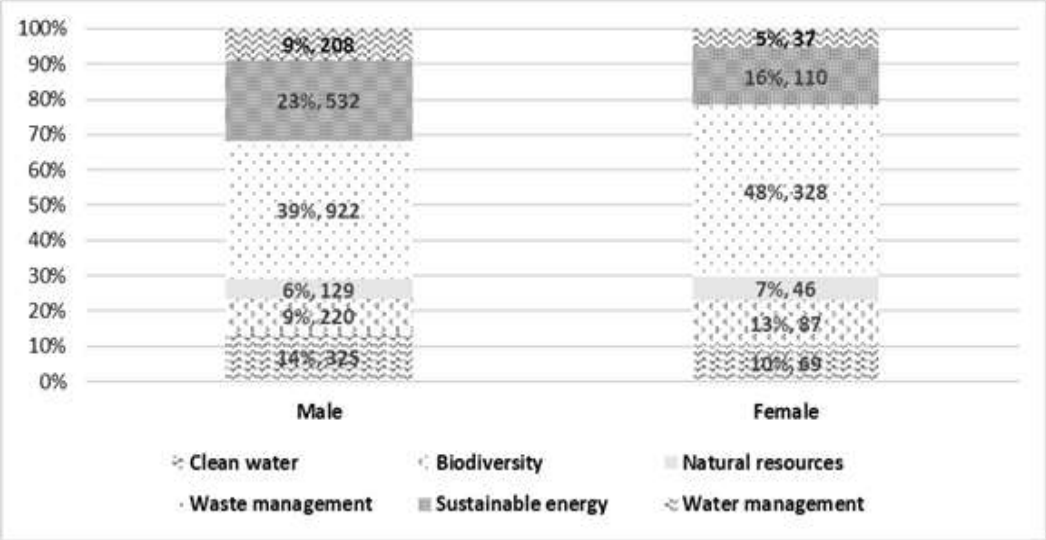

Figure 3: Preferred environmental-protection impact area, by gender

5. Conclusions

The involvement of entrepreneurship in sustainability is an increasingly present theme in contemporary theoretical and practical concerns. Today, it is considered as being a key factor for business success, a source of/for innovation and competitive advantage. What is more, it is essential for economic growth and for addressing the ecological, economic and social problems of our contemporary society.

Scholars, policy makers and entrepreneurs alike are trying to find which are the main determinants for successful sustainable start-ups, but also, to what extent characteristics such as gender, age, education, or work experience determine a certain predisposition (or reluctance) towards sustainable businesses. The literature has not yet fully agreed on these influences, even though mainstream views state that women seem more concerned about

sustainability as compared to male entrepreneurs; whereas older entrepreneurs see sustainability as an insurance for the future of their descendants, young people consider it an as area where they can express their innovation and original way of thinking.

In our paper we have attempted to determine if there is a connection between the age, gender of the entrepreneur and the orientation of their business towards areas concerning sustainability, by using the results of a survey involving a large number of entrepreneurs from all over the world, entrepreneurs who have applied for various business accelerator programs during 2013-2018.

We have found that age wise, entrepreneurs interested in waste management tend to be younger than those interested in clean water and natural resource conservation. As gender is concerned, we have noticed that the trends are similar: waste management is the area that generates most interest from both male and female entrepreneurs, whereas the conservation of natural resources accounts for the least number of options from entrepreneurs. On the other hand, we do notice that male entrepreneurs are far more interested (almost two times as much as female entrepreneurs) in issues such as water resource management. In the end, those that would like that their activity influence more than 2 impact areas (as opposed to those that would like for their activity to impact only one sustainability area), manifest a special preference (more than double) for two specific domains: water management and natural resources/biodiversity conservation. Therefore, we can conclude that even though the differences are not straight-forward, older entrepreneurs, together with female entrepreneurs, manifest more interest in generating a social and environmentally positive impact through their businesses. Some of the limitations of our study refer to the reduced number of observation years, the small portion of female entrepreneurs in the total number of respondents (approx. 22%), but also to the relatively large number of impact areas, and their conceptual overlap, which can affect the generalization of results of our study. In future studies, we propose the performing of a comparative analysis by using different statistical methods so as to determine if the relationship between entrepreneurial characteristics and effective involvement in specific sustainable impact areas correlate with the intentions of founders when entering business acceleration processes.

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Rapid Educational Improvements Using Wyblo: Insights From Continuous Student Feedback

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Abstract: In the world of higher education, teaching evaluations from students do not generally allow professors to directly improve their teaching method, as changes would have an impact only on the next course and on a different group of students. This happens because the evaluation is typically done at the end of the course and the instructors receive the feedback after the semester has ended and it is too late to adjust. For this study, we examine Wyblo, a mobile application that offers students the chance to provide anonymous event-sampling feedback to their teachers, by asking them about specific pedagogical aspects for the teacher, who will then then take corrective actions based on their students' specific needs. The aim of this study is to understand professors' perception of the use of a continuous feedback tool. The intention is to discover if professors find an added value in receiving event-sampling feedback from their students. As a more general purpose, we aim at providing scientific validity to the usage of the Wyblo App in higher education. We conducted an empirical qualitative research to answer the following research question: *How do teachers feel about using a continuous feedback tool with interactive dashboards and open comments?* The collaborative approach adopted allowed us to comprehend the professors' insights on the usage of continuous feedback from students, all while enhancing the teaching quality. We conducted about 20 interviews with selected professors who have used the Wyblo app in their course. Our results provide support for the value of this entrepreneurial project. According to the professors, continuous feedback from students is an efficient solution to educational problems. For instance, it helps by: focusing on the learning needs; enhancing classroom interactivity, both in the classroom and online environments; gaining information about students' personality and work style; monitoring motivational and emotional factors. The value of this research lies in the pedagogical underpinnings that it contributes to providing to the Wyblo App, allowing teachers to utilize a validated tool for improving teaching quality. Moreover, this work can be the springboard for further studies on continuous feedback through digital technologies.

Keywords: continuous feedback, entrepreneurship, teaching quality, EdTech, digital technologies

1. Introduction

Nowadays, the major changes we see at various levels – individual, socio-economic, political, technological – make the role of innovation and entrepreneurship crucial in finding solutions to the growing challenges of the 21st century (Damanpour, 2014; Lindfors & Hilmola, 2016; Stibe, 2020). This debate is also gaining momentum in the world of education and learning: among higher education institutions, there is a great demand for effective quality assessment and quality assurance systems (Patier, 2008). These concerns come from many stakeholders – governments in policy and funding decision-making, companies demanding highly qualified profiles, students aiming at the best education for their personal and professional development – and therefore, the situation is very complex.

As for quality assurance and assessment, we found that the majority of the indicators currently used are based on an economical and pragmatist approach, which mainly responds to the needs of governments and companies (Abdullah, 2006; Orsingher, 2006). Nevertheless, students' main interest – a good teacher– is evaluated in terms of benchmarks within the same conceptual approach. Although it is commonly recognized within the pedagogy

scientific community, this happens a lot. The teaching-learning process is socially constructed and continuously variable, therefore it is limiting clustering it in such a static approach (Mascolo & Fischer, 2004). In fact, even when students' opinions are indeed taken into some consideration, they are used in a summative evaluative function, which belongs to a positivistic/pragmatic approach (Colina, 2021; Selva, 2014). Therefore, students' teaching evaluation does not necessarily respond to students' interest in improving the quality of the courses they attend. Students should take great part to this process, as it will positively enhance their learning experience, all while improving their institution's teaching quality (Ulker, 2021; Wu, 2019; Hammonds, 2017). Their feedback needs to be valued, within a constructivist evaluation framework (Guba & Lincoln, 1989).

Feedback, in education, can be defined as a fundamental element for learning, as it is the information that comes back about the effects of ones' actions (Christ, et al., 2016). From a socio-constructivist perspective, the co-construction of the learning and teaching process quality can be facilitated by a feedback process flowing, not only from teachers to learners, but also in the opposite direction, as a formative practice (Watzlawick, et al., 1967; Kahu, 2008; Christ, et al., 2016).

With this study we shed light on Wyblo, an EdTech startup that developed a platform (app and web) which allows teachers to ask for a direct feedback on the motivation and learning progress of students, thereby improving the impact of their teaching and ultimately increasing the overall quality of the course. The solution of Wyblo aims at integrating the current evaluation system on teaching with a digital tool allowing the teaching evaluation to be from a cognitivist and socio-constructivist perspective. The underpinning idea is that with Wyblo, it is possible to detect and monitor normally tacit factors of the learning process throughout the course, in a formative function; ultimately allowing teachers to co-construct a quality teaching-learning process with their students.

We focused our attention on university instructors (Hattie, 2009), with the aim of answering the following question: *How do teachers perceive receiving continuous feedback from their students through the Wyblo app?*

Findings provide a significant and practical contribution to the world of education and entrepreneurship in this field. Firstly, the teachers interviewed agreed that continuous feedback from students has an important value. This is valuable, especially for professors to verify the effectiveness of their lessons and to know the students' opinion consistently and after the lessons were carried out. Secondly, the Wyblo app is considered to be a useful and reliable tool. Teachers state they can easily interpret the dashboards resulting from feedback, and from that point understand actions to take. Moreover, they recognized the dashboard results and their changes in relation to concrete behaviors and actions that took place in class. Finally, the teachers interviewed agree that the tool is relevant for improving teaching methods. This process is fostered by two factors that generate positive results for both students and teachers: real-time feedback and motivation. Real-time feedback allows a bilateral co-construction of new knowledge in terms of learning needs and tailored teaching practices. Motivation fosters teaching quality growth, as it allows students to become protagonists of their own learning process. When teachers see this, they become more engaged in ensuring a high quality of teaching, as well as enhancing their professionalism.

2. Theoretical and empirical background

The first section draws on the pedagogical literature to understand the current context in measuring the quality in higher education. We highlight the existence of two main approaches: summative and constructivist. The second explores the literature on feedback. The third provides an overview of the Wyblo app. In this regard, here a special attention is given to the pedagogical basis. We can argue that there is growing attention from various stakeholders to the quality of education, a challenge of the 21st century (Damanpour, 2014; Lindfors & Hilmola, 2016; Stibe, 2020). In this respect, stakeholders should consider several dynamics, including educating future leaders who can rely on the right skills to contribute to the advancement of society: innovation, entrepreneurial orientation, critical thinking, problem-solving and so on (NRC, 2012; Amin, 2016; OECD, 2016; Barak, 2017). National governments funding their public universities demand guarantees on the quality of the courses they provide, just as the students who enroll in them do. Defining and measuring quality standards for higher education is a matter of accountability, competitiveness and of requirements for accreditation and recognition (Patier, 2008).

The specific educational offer quality has an important weight in the overall institution quality evaluation, as well as the quality of teaching, which is one of its components. Students' opinions, and therefore their evaluation of teaching, have different weights on the quality evaluation estimation, depending on the quality assessment system institutions adopt (Orsingher, 2006). However, in most cases, institutions share the same approach to evaluation: a rationalist-positivist approach, aimed at detecting and measuring, through benchmarks, the gaps between set objectives and achieved results (Selva, 2014; Abdullah, 2006). In this approach, students' opinions are collected at the end of courses and they function as a summative assessment. This approach seems to succeed in meeting the need for quality assurance demonstration and accreditation compliance. Nevertheless, studies show that it only marginally and indirectly contributes to improving the quality of teaching (Barak, 2017; Hammonds, 2017; Colina, 2021). The summative characteristic of students' evaluation to teaching results in the impossibility for teachers to take advantage of the information collected to improve the course itself (Ulker, 2021). Furthermore, students are less involved in the evaluation process, as they perceive it as distant and useless for them. Nevertheless, studies show that an active engagement of students in their teaching evaluation process results in enhancing the learning quality (Carvalho, 2020). Moreover, there is irreconcilability between the rationalistic approach adopted for assessment and the pedagogically recognized constructivist approach to the teaching-learning process (Young, 2008). This constructivist perspective includes several theories and approaches which focus on the interactions among individuals (Vygotsky, 1978; Piaget, 1985; Lemke, 2001; Bandura, 2001; Mascolo & Fischer, 2004) and to some extent, emphasize the importance of feedback (Kahu, 2008; Henderson, et al., 2019).

Feedback is valuable for learning when it constructively directs toward improvement of learning strategies and processes, and it is effective especially if and when people actively engage in the whole feedback process (Watzlawick, et al., 1967; Hattie, 2009). Effective feedback provides information on what has been done, an evaluation and guidance on how performance can be improved. Developing optimal communication is the root of knowledge creation and continuous feedback is undoubtedly an essential support to make it better and more efficient (Watzlawick, et al., 1967). Furthermore, developing knowledge means learning information that comes back from the environment (Butler & Winne, 1995). The basic requirements for effective feedback are clarity and immediacy, as they allow a constant analysis of the action-reaction exchange to maximize the potential of everyone involved in the process (Black & Wiliam, 1998). Feedback and formative assessment are the elements that most and best positively affect learning and teaching (Black & Wiliam, 1998; Kahu, 2008). Formative assessment is a process used by teachers and students during instruction that provides feedback to regulate ongoing teaching and learning, and more generally, the implementation of teaching objectives. Thus, the evaluation we are dealing with is *in itinere*, when there is still time and space to learn, and has the objective of adapting the teachers' teaching procedures to the learning strategies of their students. The teacher, through formative feedback, leads the students to develop a certain autonomy and self-regulating mechanisms (Butler & Winne, 1995; Poertner & Massetti, 1999) which can in turn foster an entrepreneurial orientation and, in general, greater responsibility and engagement among students (Barak, 2017). According to House and Howe (2003), an optimal learning process should respond to students' characteristics and detect weaknesses in their learning pathway, rather than determining numerically what the results were. Feedback is a support tool and not a substitute for interpersonal relationships. The coexistence of educational sciences and data analytics aims precisely at stimulating processes of reflection, sharing of actions, and understanding of the other's viewpoint through these new languages (Turkle, 2011). Technology has powerful value if we use it to relate better to others, as in the case of continuous feedback (Twenge, 2018; Pinto & Leite, 2020).

The Wyblo app was developed, in relation to the socio-constructivist theoretical framework, to enable an assessment of students' motivation and provide continuous feedback with personalized recommendations to students, teachers, and institution in hopes of leading them to data-driven decision making, valuing learners' contribution in the institution quality improvement. Wyblo provides an overview of each student's learning experience in form of graphs and dashboards. These are generated automatically with students' answers to hypothetical-projective questions, randomly selected, at the end of each lecture, impacting on the pedagogical concepts that make the framework. Moreover, teachers are provided with the aggregate visualization of the class in real time.

3. Research methodology

The reason behind this research project on this topic lay on two relevant needs: the educational need for continuous feedback in the teacher-student relationship aimed at improving the quality of the teaching-learning

process and the need to validate an innovative tool for the construction of feedback with a pedagogical focus used on an experimental basis (Plomp, 2007; Kelly et al., 2008). The epistemological orientation adopted was qualitative as we wanted to in-depth understand the subjective perceptions of the teachers interviewed. The cognitive aim was twofold: (1) understanding the experience of using Wyblo from teachers' viewpoints; (2) investigating at first hand the value of receiving feedback in a continuous way, focusing on specific pedagogical aspects elaborated in the Wyblo app.

Coherently with the main intents, our study was guided by the following research question: *How do teachers feel about using continuous feedback through the Wyblo app?*

We rely on a collaborative approach and an action research project (Shani & Pasmore, 1985; Pasmore, 2008) to actively involve the teachers interviewed, not only for research purposes, but also to solve a real problem together. Ten teachers agreed to participate in the study and to be interviewed during their experience of using the app. This evolving process (Shani & Pasmore, 1985) allows us to support teachers understanding of the platform and contributing to the improvement of their training activities, starting from the results collected.

The study consisted of two interviews of about 1 hour with each teacher, the first was carried out after three uses of Wyblo and the second after about halfway through the course.

The first interview was aimed at:

- ensuring effective understanding of the functioning and readability of the platform;
- investigating the teachers' general perception on the educational value of continuous feedback;
- detecting and commenting on any critical values, providing the elaboration of targeted intervention proposals.

The second interview was focused on the analysis of teachers' dashboard results achieved as a consequence of the corrective actions suggested during the first interview and/or personally identified and implemented by the teacher.

We chose interviews and so, a qualitative perspective (Patton, 2005), mainly for two reasons: we believe that in the direct verbal relationship among interviewers and interviewees deep and subjective insights emerge; at the same time, it was possible to co-construct the improvement intervention actions. The process was carried out by Benedetta Diegoli and Giulia Sparisci as their pedagogical background made them the most suitable people to interpret the platform's insights and suggest corrective actions to be implemented in the various courses (Plomp, 2007; Kelly et al., 2008). In some cases, Kevin Giorgis and Stefano Marchese also took part in the interviews, focusing more on product improvement aspects.

As we are also members of the Wyblo team, we were supported by two academic experts, Robert Kordts-Freudinger and Agnis Stibe, for rigorous suggestion on how to maintain a research focus in the interviews, without incurring in possible biases resulting from our entrepreneurial venture. We conducted semi-structured interviews based on a reference canvas with broadly scoped research questions. These gave us the possibility to have more flexibility and to let emerge the teachers' perspective, new findings, and suggestions (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). Moreover, we used open questions, letting the interviewees "speak first", resulting in more authentic and reliable information (Flick, 2009). The second half of the first academic semester (November - December 2020) and the first half of the second academic semester (February - March 2021). As shown in Table 1, only two teachers had previous expertise in the field of pedagogy. However, they are characterized by a certain attitude to continuous professional improvement.

Table 1: List of teachers interviewed

Institutions of teachers interviewed	Teaching Area	Number of interviews
Comenius University in Bratislava	Psychology and Pedagogy	3
Burgundy School of Business	Finance	2
Tor Vergata University of Rome	Physics	2
University of St.Gallen	Psychology and Pedagogy	3

Institutions of teachers interviewed	Teaching Area	Number of interviews
Politecnico di Milano	Management Engineering, Innovation and Organization	3
Bologna Business School	General Management Program	2
Roma Tor Vergata University	Physics	2
Roma Tor Vergata University	Engineering and Management	3
EM Normandie Business School	Leading Organizational Change	2
Università di Cagliari	Physics	2

Evidence from the interviews was collected in a structured way with the Gioia Methodology (Gioia, et al., 2013), a systematic approach to examine transcriptions and helpful to keep a "qualitative rigor" in conducting and presenting the research. In the first-order analysis, the most promising concepts were extracted and the interviewees' sentences were not modified to adhere faithfully to the original terms. A second-order analysis was made by grouping together sentences with similar meanings. Finally, with the third level of coding, we finalized a model with sufficient categories to answer our research question.

4. Results

Since the initial business meetings, all teachers emphasized the importance of feedback in the teaching-learning process. They showed a strong interest in Wyblo as a useful innovative tool for *challenging* students to continuously improve and – thanks to its intuitive dashboards – for understanding what to focus on to take actions for more effective lessons. The openness towards a digital solution of this kind could indicate a relatively easy adoption in the higher education field. Nevertheless, it is worth pointing out that these teachers are "early adopters" (Rogers, 1962; Lane, 2015); thus, it is reasonable that they are more confident about innovation, digital technologies and – more specifically – are not afraid of receiving structured feedback from their students. Focusing on the interviews conducted, the different quotes collected highlighted four propositions that have been developed during the research journey. These propositions are linked to four main benefits that define our final model for answering the research question: Usefulness, Educational Value, Reliability and Satisfaction. An attempt was made to consider all the teachers' perceptions and ground them in three orders of analysis, finally arriving at the benefits. In Figure 1 below, it can be seen the data structure of the coding process carried out for the first aspect that emerged from the interviews.

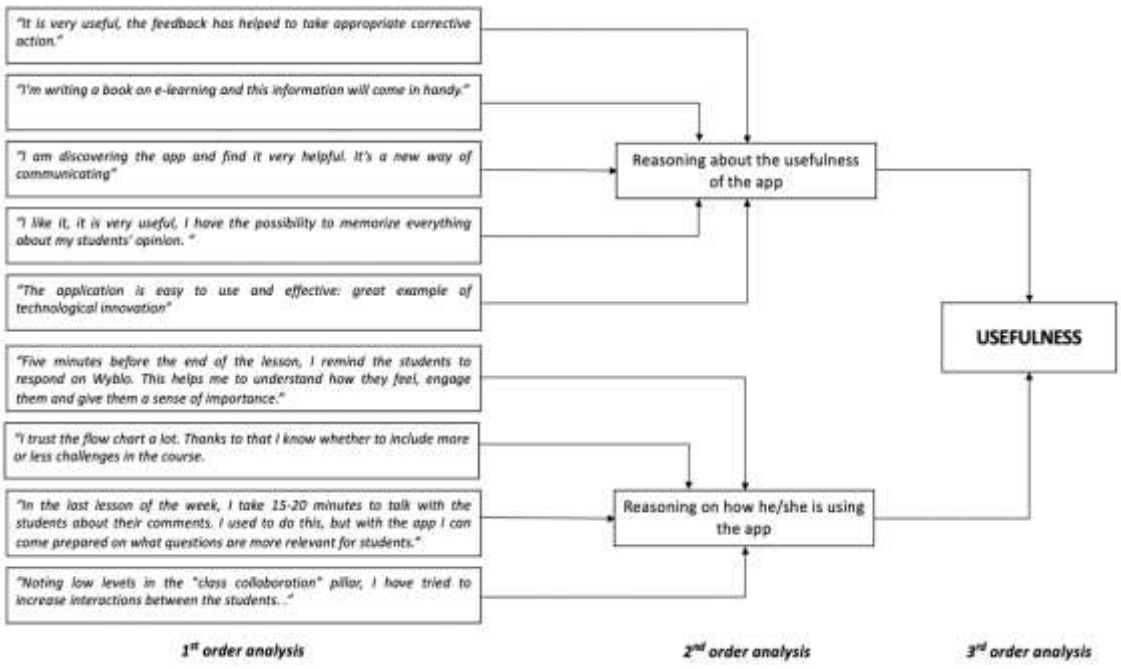

Figure 1: Example of Gioia methodology to real quotes of this study

Teachers recognized Wyblo as an extremely useful and easy-to-use tool: it was described as *"a great example of technological innovation".* Overall, they had a positive perception of the application, albeit emphasizing different values (*"feedback has helped to take appropriate corrective action"*; *"I have the possibility to memorize everything about my students' opinion"*; *"It's a new way of communicating")* and ways of usage (*"I trust the flow chart a lot"; "five minutes before the end of the lesson, I remind the students to respond to Wyblo";* etc.)

According to the described quotes, we have developed the following proposition:

P1) Teachers are confident in the use of dashboards and find the Wyblo app useful

Regarding the second aspect, teachers agreed with the ethos of Wyblo. One of the teachers said: *"the students don't need to memorize systematically"*, implying that with the app, his students can continuously monitor the assimilation of the various concepts and their position in relation to the rest of the class. Another teacher stated that the app is *"an opportunity to help each other"*. All teachers tried to convey directly to their students the importance of feedback: *"I unlock the survey to give them an opportunity, you leave the feedback for me, it's a teamwork through which we grow together"*; and 7 out of 10 teachers confirmed that they reminded to ask for feedback at the end of each lesson.

Most of the teachers (8) told us that they looked at the dashboards every time they received feedback and one of the two teachers who didn't, said: *"To be honest I don't check the result directly each time after the course, but I do it once a week, when I think about it and I prepare the next class. I use it to see if I'm on track".*

According to the described quotes, we have developed the following proposition:

P2) Teachers encourage students to respond to surveys and frequently check dashboards

The third aspect refers to the performance achieved through the corrective actions suggested by the dashboards and agreed with the pedagogists of the Wyblo team. In this regard, teachers relied on the charts and on the pedagogical support offered and the majority of them (8) implemented at least one corrective action during the course: *"through reading the comments I have been told several times that the explanations are sometimes too fast, so I tried to go slower"*; *"I saw from the charts that the lesson was perceived as too easy, so I tried to make it more challenging"*; *"the class collaboration pillar was low, so we designed a project work to boost interactions among the students"*. From the dashboards, the teacher themselves noticed the improvement from one lesson to the other. In this sense, 8 out of 10 teachers spoke of "practicality" with regard to processing and reading the values in the graphs, i.e. the insights provided are understandable and actionable immediately.

Only two teachers were somewhat unable to measure the reliability of the app: the first had excellent results on all the pillars and therefore there was no need to intervene; the second considered low levels in the "interest in the material" feedback pillar as immutable, because "*some students do not love my course because it is company psychology while they are studying this bachelor as they are mainly interested in clinical psychology"*, and he did not try to take any corrective action.

According to the describe quotes, we have developed the following proposition:

P3) Teachers implement corrective actions based on the results of the dashboards and our recommendations, resulting in improvements in that specific pillar

The fourth aspect that emerged focused on how the use of Wyblo facilitated their teaching experience.

All the teachers were enthusiastic about using Wyblo: *"I appreciate that all is transparent. With my students, with the administration and with you."*; *"Immediacy is the added value, and it is definitely a new way of communicating"*. Moreover, they stated about the anonymous comments (which, of course, can also be negative) and the percentages with the degree of motivation, showing themselves to be far from discouraged about possible low results. On the contrary, they seemed engaged and happy to challenge themselves, *"I really enjoy looking at the results and seeing what they have answered"* and they claim to have a better understanding of how to effectively transmit new knowledge to their students: *"using Wyblo I have more feeling in how to relate with my students, I think that action and reflection is the key"*.

According to the described quotes, we have developed the following proposition:

P4) Teachers have seen an improvement in their teaching experience

Wrapping up these propositions, Table 3 below highlights the benefit associated with each of them, the percentage related to the positive results achieved and a general description of the teachers' perceptions.

Table 3: Proposition and summary of results.

Perceptions' description	Propositions	Benefits	Percentage of positive answers
They perceive the Wyblo app useful for understanding what adjustments to do	Teachers are confident in the use of dashboards and find the Wyblo app useful	Tool Usefulness	100%
They believe in the importance of continuous feedback in improving teaching quality and enhancing motivational processes	Teachers frequently check dashboards and encourage students to respond to surveys	Continuous feedback Educational Value	100%
They recognize the dashboard results as significant and relate them to concrete actions or behaviors undertaken in class	Teachers implement corrective actions based on the results of the dashboards and our recommendations, resulting in improvements in specific pillars	Tool Reliability	80%
They are satisfied to receive feedback instantly	Teachers have seen an improvement in their teaching experience	Continuous feedback tool Satisfaction	100%

Although the sample is limited to 10 teachers interviewed at least twice, our results confirm the importance of feedback in improving the quality of teaching. In particular, also according to the literature, we have highlighted the following strengths: (1) feedback collected and organized through dashboards, allows people involved (both teachers and students) to understand if the behaviors and methodologies adopted are effective; (2) feedback is useful to change what is hindering growth and good performance, by taking quick corrective actions; (3) receiving feedback allows to see oneself from the other's viewpoint and consequently broadens one's self-awareness (Bryan & Clegg, 2006); 4) Feedback from both sides and shared in a transparent way allows students and teachers in building a system of relationship based on collaboration and social well-being. Moreover, the specific digital tool used to provide pedagogically oriented feedback is felt as useful and reliable, giving a sense of satisfaction among the whole sample.

As for negative or critical aspects of the Wyblo app emerged during interviews, they can be divided in two main categories: (1) Action plan absence, meaning some teachers expected the Wyblo app to provide them with recommendations in relation with the results so for them to take specific actions ("*so what can I do now? Shouldn't the app tell me?*") without needing a live interaction with the pedagogists of the team. (2) Lack of a feedback culture, as an explanation of a low number of students' feedback provided if the instructor does not ask for it or encourage students to do it ("*if students think things are ok, maybe they don't understand why they should keep giving me feedback*"; "*I scold them! They have to understand how important is this to both of us*").

5. Discussion and expected contribution

This study reveals promising evidence that may be of interest to different communities of both academics and practitioners. Given the theoretical lens of this study which set out to investigate teachers' perceptions of using an innovative tool based on continuous feedback, we want to contribute to the area of pedagogy. Of course, due to our entrepreneurial background, this study could give rise to several research papers which can investigate how to develop an entrepreneurial mindset within a course, how to assess innovative teaching methods and so on.

The aim was to understand whether the Wyblo app could enhance socio-constructivist theories, i.e. facilitate collaboration and co-creation among students and teachers (Henderson, et al., 2019). From the teachers' perspective, results are encouraging. The Wyblo app effectively enables the teaching quality co-construction process. Teachers perceive the tool as useful in contributing the constant improvement of their teaching activity by tailoring it to students' specific needs and demands. From one side, teachers agree that real-time feedback

specifically focused on pedagogical relevant pillars allows a bilateral growth of new knowledge regarding learning processes and teaching activities. On the other side, motivation in both teachers and students seemed to increase, thanks to the use of the app. Students appeared to become agents of their own learning process and teachers to be more engaged in ensuring a high quality of teaching, as well as enhancing their professionalism.

This study highlights that the Wyblo app is a tool based on well-affirmed pedagogical theories, as well as that it responds to a concrete issue, in the higher education field. Moreover, it came out that, despite its relevance and longing, there is no such tool used in institutions – there are tools such as classroom polling, real-time communication, but none so specific about feedback – and no other research with this focus and action methodology were undertaken.

This study should be considered as a springboard for further research that could build on the limitations of this work. First, teachers involved in the pilots are extremely motivated individuals, “early adopters” who therefore approached themselves to the app in a positive mindset. Future research should involve less motivated and/or more “traditional” teachers. Second, the number of teachers interviewed is limited and they were interviewed in their first usage of the app. Future research should involve a group of teachers more expert to truly find regularity in the effects of the actions they undertake based on the graphs, without the guidance of the researchers. Third, the low number of quantitative data does not allow to generalize our results. Future research should involve a larger number of teachers, to allow for greater generalization. Finally, it would be interesting to investigate the other actors of the co-construction (students) to understand their perceptions on the teaching and learning quality improvement, and further the empirical effects on their learning outcomes, in correlation with their usage of the Wyblo app and, in general, with providing continuous feedback.

To conclude, the contribution of this paper is intended to be a spark for the actors in the world of education. We highlighted teachers' desire to know the opinion of their students constantly and in close connection with their lessons, and how the use of a digital tool, that encourages this practice can be effective. We are confident that we can attract interest from academics and entrepreneurs who could use the tool for further research and/or new services, as well as help institutions and policymakers to continuously improve the quality of teaching and education.

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University Social Innovation Projects Responding to Covid-19

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Abstract: In early 2020, COVID-19 crossed international borders and became a pandemic severely affecting public health worldwide. Health services were stretched thin. The confinement also triggered other social, economic, and cultural problems. Unemployment increased, family dynamics changed, and educational institutions faced the challenge of continuing academic operations. Governments implemented mechanisms to address the situation, but their efforts have been insufficient. Private companies, foundations, civic organizations, universities, and citizens in general, began to respond with creative problem-solving projects. Moreover, universities implemented social innovation projects to deal with pandemic challenges. In this study, we reviewed the websites of 20 universities selected from a pool of internationally ranked institutions to analyze such projects. Of these, seven universities were in North America, Europe and Asia; seven in Latin America, and six in Mexico. The analysis was qualitative and inductive. There was information related to COVID 19 in all the websites reviewed, such as sanitation measures, recommendations, news, and the university's guidelines. They also featured information about the social innovation projects organized by these universities. The identified projects were categorized into four areas: a) scientific research, including projects related to vaccine development and treatments; b) education, enclosing digital systems for academic continuity and educational programs for society; c) technology, used in team development projects and strategies, and d) innovation, with holistic proposals for emotional, physical, and psychological care and well-being. Several projects leveraged technological tools to resolve the various complexities of health confinements, resulting in digital social innovations. It was observed that the pandemic accelerated the social- digital innovations, thereby blurring the limits between the technological and the social. Such a tendency presents an opportunity for universities to generate more projects and escalate those already in existence. Therefore, reviewing the status of these projects may ensure their continuity or adaptation to the new normal of pandemic and post-pandemic times.

Keywords: university, social innovation, Covid-19, higher education, educational innovation, digital social

1. Introduction

On March 11, 2020, the Director-General of the World Health Organization (WHO), Dr. Tedros Adhanom, declared Covid-19 a pandemic when 114 countries reported cases of the disease caused by the SARS-CoV-2 coronavirus. More than 100 thousand cases and 4291 deaths had been reported (WHO, 2020). Since then, Dr. Tedros has called on countries to take urgent and aggressive actions. He noted that countries should test for cases, isolate them and track transmission of the virus to contain the contagion. He also urged that entire governments and society as a whole should address the public health emergency (WHO, 2020).

The participation of all society, mentioned by Tedros, is necessary and valuable because the social problem has exceeded the actions, capabilities, and resources of governments and the health sector. Therefore, private institutions and companies, international organizations, foundations, universities and civil society have responded with financial and in-kind contributions. In addition, they formed research, design, and volunteer teams, among many other actions.

As of June 9, 2021, there have been 173,674,509 confirmed cases and 3,744,408 deaths since the start of the pandemic (WHO, 2021). Additionally, this health emergency has triggered many economic, social, cultural and emotional challenges. Thus, a spade of opportunities arises to generate innovative solutions to these social problems.

The university has been one of the actors taking measures to confront the situation, carrying out social innovation projects to benefit the community, which has been violated physically and emotionally, economically, in its family and work dynamics, and its activities in general.

This research aims to review the types of social innovation projects universities have implemented in different parts of the world and how they have carried them out. This will show how universities can contribute to solving social problems and allow successful social innovation projects to be replicated in other contexts.

2. Theoretical framework

2.1 Universities and social innovation

Social innovation is understood as searching for more effective and efficient solutions to existing problems, favoring social ones over individual ones. It seeks to generate value that contributes to the well-being of people (Oganisjana, Svirina, Surikova, Grinberga-Zalite and Kozlovskis, 2017), offering new and creative solutions, which can be concepts, products, strategies, services, and practices. Social innovations transcend spatial and sector borders. Various actors and stakeholders participate, such as governments, companies, foundations, and universities (Murray, Caulier-Grice and Mulgan, 2010; Gleason, Rubio, Ruiz and Velázquez, 2020). These often work collaboratively in different roles to collect information about the problem, create and develop ideas, and raise funds. (Oganisjana et al., 2017).

Social innovations undergo an implementation process. Murray et al. (2010) highlight six fundamental stages: diagnosis and causes of need, generation of ideas and proposals, development of prototypes and pilot tests, evaluation and support, dissemination and scaling, and systemic change. As seen in these stages, social innovations go beyond generating an idea; they continue to resolve the problem until social change is achieved.

For their part, universities have innovated their educational processes to fulfill their teaching and research mission. They have designed new educational models that promote meaningful and experiential learning through collaborative work to develop disciplinary and transversal competencies in their students. Some strategies that universities implement include challenge-based learning, project-oriented learning, case studies, and learning through service. These strategies have promoted service for the benefit of society, driving the third university mission, by involving students in problem-solving in a real-world environment, working in and with the community through social innovation (Gleason and Rubio, 2020; Bina and Pereira, 2020).

The various programs and activities of university social innovations include community laboratories, workshops, social entrepreneurship programs, international exchanges, internships, social research projects, and technology and engineering projects (Gleason and Rubio, 2020).

The participation of universities in the field of social innovation has grown in recent years. However, it still needs to be promoted to integrate more with teaching and research missions and modify university structures to accommodate social innovation as part of the third university mission. Moreover, universities need to measure the results of their social innovations and achieve scaling of their projects and systemic change. These represent the area of opportunity for universities to be excellent agents of social innovation (Bayuo, Chaminade and Göransson, 2020; Gleason, Rubio, Velázquez and Islas, 2021).

2.2 Digital social innovation

The accelerated growth of technologies and their permeation everywhere have made the concepts of social innovation and technological innovation meaningful (Dawson and Daniel, 2010; Manzini, 2015), combining to form the term "digital social innovation."

Digital social innovation is a phenomenon in which digital technologies are harnessed to solve social problems in the environment, health, or education, among others, to empower people and create a more sustainable society to improve their lives (Stokes, Baeck and Baker, 2017).

Bria (2015) and his colleagues present in their report to the European Union six areas developing digital social innovations (see Figure 1).

However, the potential of social innovations has not been exploited. Therefore, strategies must be designed and integrated to raise funds, form collaborative work teams, monitor projects' progress and growth, and, thus, achieve social change (Stokes et al. 2017, Gleason et al., 2021).

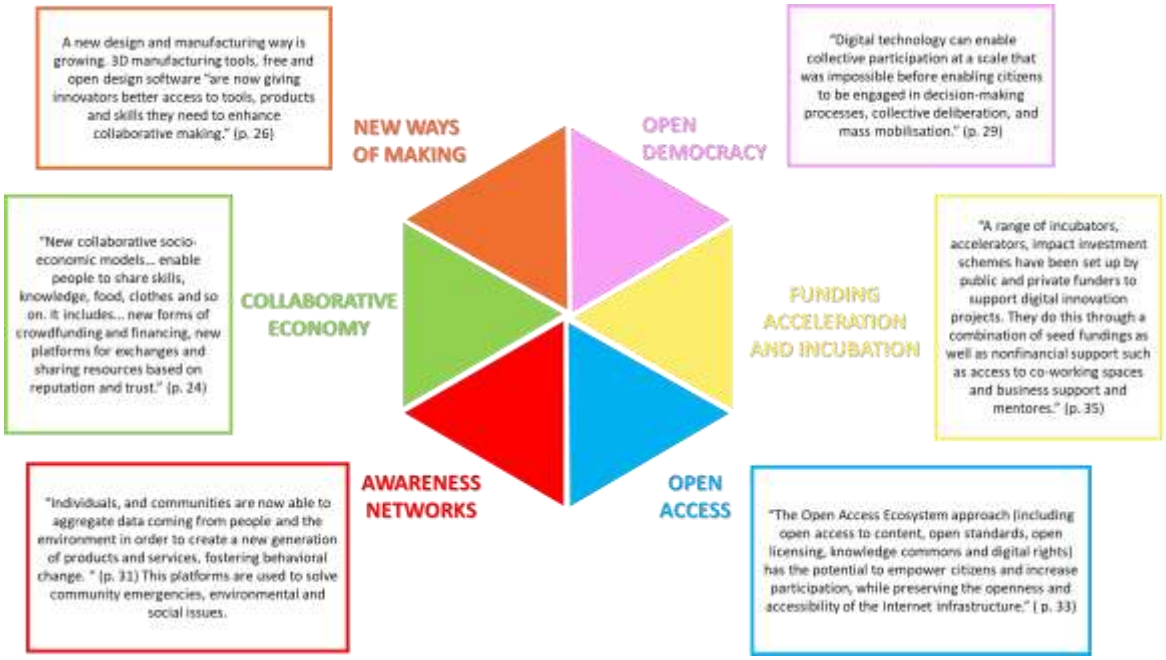

Figure 1: Areas of digital social innovation. Source: Bria (2015, p. 24)

3. Method

This study investigates the social innovations universities are making to respond to the Covid-19 pandemic and how they do it. Qualitative methodology was chosen because it "represents a legitimate mode of social and human science exploration" (Creswell, 2013, p. 6) such as higher education respond to the pandemic social problem. We proceeded with a qualitative methodology, performing "a set of interpretative and material practices that make the world visible..." (Denzin and Lincoln, 2011, p. 3). As Denzin and Lincoln (2011) point out, the qualitative researcher operates in the world, and in this work, the observed world was the digital world, which represents reality. During May and June 2020, we collected information from 20 university websites, exploring them inductively and flexibly to understand the phenomenon studied. The universities were chosen using data from the QS Ranking (QSR)(QS Top Universities, 2020a, 2020b, and 2020c) and The World University Rankings (WUR) (2020a, 2020b, and 2020c), selecting from their rankings a variety of universities from different countries.

The research corpus is organized in Table 1.

Table 1: Corpus of research of universities consulted through their websites. Source: Gleason and Rubio (2021)

Universities in North America, Europe, and Asia	Universities in Latin America	Universities in Mexico
Massachusetts Institute of Technology (MIT) Country: United States of America	Pontificia Universidad Católica de Chile (UC) Country: Chile	Instituto Politécnico Nacional (IPN) Country: Mexico
Stanford University Country: United States of America	Universidad de Sao Paulo (USP) Country: Brazil	Instituto Tecnologico Autónomo de Mexico (ITAM) Country: Mexico
Harvard University Country: United States of America	Tecnologico de Monterrey Country: Mexico	Universidad Iberoamericana (IBERO) Country: Mexico
University of Oxford Country: Great Britain	Universidad de los Andes Country: Colombia	Universidad de Guadalajara (UDG) Country: Mexico
ETHzürich Swiss Federal Institute of Technology Country: Switzerland	Universidad Nacional Autónoma de Mexico (UNAM) Country: Mexico	Universidad Autónoma de Baja California (UABC) Country: Mexico
Nanyang Thechnological University (NTU) Country: Singapur	Universidad de Buenos Aires (UBA) Country: Argentina	Universidad Autónoma de Yucatán Country: Mexico (UADY)
Tsinghua University Country: China	Universidad de Costa Rica (UCR) Country: Costa Rica	

It should be noted that the corpus is a sample of a larger universe and that unselected universities, universities that do not have a website, and projects not published on the universities' websites were excluded from this study.

4. Results

The review of the 20 university websites revealed that all of them immediately posted general Covid-19 information, health recommendations and institutional guidelines for academic continuity during the health emergency. Some universities began fundraising for donations to the health sector and held various digital conferences, forums, and specialist panels on the pandemic.

Several social innovation projects were identified, which were categorized into four groups. However, several projects have elements fitting more than one category, so the proposed classifications must be considered flexibly.

a) Scientific research

This category includes projects on vaccine research, treatments, and drugs for Covid-19 led mainly by the faculties of Medicine, Health Sciences, and Biotechnology. Due to the magnitude of the problem affecting the entire population's health regardless of geography or socio-economic and cultural conditions, this category had significant participation from stakeholders in government, pharmaceutical companies, laboratories, and civil organizations working with the universities to find a solution quickly as possible. Table 2 shows some examples of social innovation projects in scientific research.

Table 2: Examples of university social innovation projects in the scientific research category

University and collaborating actors	Social innovation project in scientific research
Oxford University (2020) AstraZeneca	Vaccine development and distribution.
University of Sao Paulo (2020) Oxford University Bern University Hospital das Clínicas	Vaccine development.
UNAM (2020a) National Institutes of Health, some hospitals, and other universities	Vaccine development and medical treatments.
ETH Zürich, (Keller, 2020)	Vaccine development, diagnosis, treatments, epidemiology, intensive care and protective uniforms.
Tecnologico de Monterrey (2020a)	Protocol for convalescent plasma, UV sterilization systems, monitoring to detect the virus, creation of tests.
Tsinghua University (2020a)	Development of vaccine and treatments by identifying antibodies in convalescent patients.

The projects in this category took place in a collaborative environment where knowledge and information about scientific advances for vaccines and treatments were shared and economic cooperation to finance research. This collaboration among institutions worldwide, as was the case with the first three projects, was possible thanks to digital technologies. Therefore, we could identify them as digital social innovation projects in several areas proposed by Bria (2015), mainly in the Collaborative Economy and Open Access areas.

b) Education

The social innovation projects in education were related to the universities' academic continuity strategies and support to other educational institutions of various levels. Likewise, we noted projects that address the educational needs of specific groups, such as pregnant women and indigenous people, and society in general.

Table 3 displays some of the social innovation projects in education.

Table 3: Examples of university social innovation projects in education

University and collaborating actors	Social innovation projects in education
University of Oxford (Oxford Foundry, 2020)	Project Smash Medicine shares its EdTech platform for free with the State Council of Medical Students of Spain and six universities in Europe.

University and collaborating actors	Social innovation projects in education
Tsinghua University (2020b)	Project Cloning allows other universities to clone courses from their platforms.
UNAM (2020b)	Open access to the general public of their library.
	Dissemination of festivals, concerts, and music, dance and theater activities in the Covid-19 CulturaUNAMenCasa program.
MIT (2020a y 2020b)	Development of digital educational continuity tools for students and teachers with the RemixEd: Creative Learning Design Tools project.
	Birthing Bridge project aims to guide women in Africa in prenatal and postnatal maternal care during the pandemic.
Tecnologico de Monterrey (2020b) UNAM Instituto Politécnico Nacional University of Guadalajara Iberoamerican University	Creation of the Educational Innovation Network website for teachers who need and use virtual teaching educational materials.
Tecnologico de Monterrey (2020a) UNAM BBVA Foundation	Project Let's Prepare, offering a free specialized course for doctors to deal with the pandemic.
Iberoamerican University (Rendón, 2020a)	Project Milpas Educativas for good living in the face of Covid-19 provides digital educational materials for indigenous people in rural Mexican communities.
Harvard University (2020)	Ask A Nerd app with a database of college students offering support to high school students.
	Free virtual classes for pregnant women with the June Motherhood project.
University of Costa Rica (2020)	Material guides and kits for families to work with their children at home through the Little Monsters at Home program.
University of Guadalajara (González, 2020)	Creation of the CUAADArte microsite provides access to photography, music, and other arts events for students to enjoy from home.

Universities found in digital technologies the way to continue academic education during the confinements worldwide. In addition, there was evident digital social innovation in the area of Open Access (Bria, 2015), as universities make digital educational content available to other universities, vulnerable groups, and society in general. The goal is to empower people with knowledge to apply it to their benefit.

On the other hand, some projects, such as the Ask A Nerd application, use technology to collect data from people and concentrate on a platform that provides educational services. This digital social innovation project is an example of the Awareness Networks area proposed by Bria (2015).

c) Technology

The technology classification included those projects related to the design and production of medical equipment, protective equipment, simulators, robots, applications, platforms, and drones that provide solutions to pandemic-related problems. Table 4 displays some of these projects.

Table 4: Examples of university social innovation projects in technology.

University and collaborating actors	Social innovation project in technology
Harvard University (2020)	Livelihood platform that connects seniors with young volunteers to make purchases or do activities.
MIT (2020b)	Project Afkathon AVV-Mask that makes reusable and efficient masks.
	Using drones to measure temperatures (Thermal Drones for Temperature Readings)
University of Oxford (Oxford Foundry, 2020)	Nye Health is a project that developed a platform through which doctors and patients of the National Health System can communicate.
	Free application called MYO used as a communication means nursing home residents and their families.
Pontificia Universidad Católica de Chile (2020)	Design of a 3D printing face protector.
Universidad de los Andes (2020)	Helmet designing project using diverse materials for different participants in #RetoCascosDeVida (#LifeHelmetChallenge).

University and collaborating actors	Social innovation project in technology
Universidad de Sao Paulo (2020)	Development and production of bottle covers, crates, shields for health personnel and disinfectant sprays for textiles.
	Projects that aim to deliver medicines and laboratory samples through a robot.
UNAM (2020b)	Design of ventilators and protective equipment.
Nanyang Technological University (2020)	Digital Health and Telemedicine project to provide primary care in health systems and avoid their saturation.
Tecnologico de Monterrey (2020a)	Development of easy-to-use, low-cost oxygen ventilator for the public
	Creation of robot that delivers food and medicine.
	Remote Detection System is a project that uses drones to take samples of Covid-19 cases.

The Technology category clearly includes digital social innovation projects. Several of the university projects have to do with New Ways of Making (Bria, 2015). 3D printing for face shields, drones, robots and the creation of protective equipment with materials and processes that use new technology are examples. The Livelihood, Nye Health, Digital Health and Telemedicine platforms, and the MYO App, facilitate communication and interconnect service networks such as those described by Bria (2015) in the Awareness Networks area.

D) Integral Wellness

In the last category, mental, psychological, emotional and social health projects were grouped. Several of these provide strategies for managing anxiety and stress and improving family and social relationships. They also promote physical activity and relaxation. Table 5 presents six projects as examples of this category.

Table 5: Examples of university social innovation projects in integral wellness

University and collaborating actors	Social innovation project in integral wellness
Harvard University (2020)	Project Cope offers a resilience support network for health professionals.
	Project Fundistancing With Art collaborates with Indonesia's population with strategies to address socio-emotional conditions generated by the health contingency.
UNAM (2020b)	Project My Health is a mental health project for vulnerable populations due to violence or depression; it implements sports and physical activities for its participants.
Universidad Iberoamericana (Rendón, 2020b)	Participation in Covid-19 and Mental Health, an initiative launched by the Secretary of Health, with projects for remote psychological care, training for children, and detection of health risks.
Tecnologico de Monterrey (2020c)	Take Care of Your Mind strategy, aimed at the educational community and society in general, has three programs: healthy mind, positive mind, and connected mind.
Tsinghua University (2020b)	Program Psychological First Aid provides personal consultations and guidance to health personnel and society at large.

Psychological and emotional care had been more distanced from technology because of the value of personal and presential treatment in these areas. However, the pandemic and lockdown increased the need for care, and universities and mental health experts turned to digital platforms to meet the demand. Some initiatives even could offer support to remote communities (With Arts, for example) thanks to the way technologies shorten distance. The physical activity programs found a new place in digital technologies through creative proposals to bring sports to people virtually. Several integral-wellness digital social innovation projects also shared information for free to the public, as the Open Access area describes (Bria, 2015).

5. Conclusions

Social problems are an opportunity for universities to collaborate with other actors to generate innovative solution ideas. In the face of the pandemic, universities were quick to show their interest in helping their communities. They maximized the use of digital technologies internally to continue their teaching mission and redoubled their efforts with countless initiatives in research and service to society.

The university projects responding to the pandemic meet the characteristics of digital social innovation (Stokes et al., 2017), leveraging digital technologies to solve social problems and empowering and improving people's lives.

Higher Education Institutions generated projects that integrate technological and social innovations in a timely, creative, and harmonious way. Coinciding with Dawson and Daniel (2020) and Manzini (2015), it is not easy to talk about them separately.

The university digital social innovation projects identified in this study belong to one or more of the areas proposed by Bria (2015). It is important to emphasize that projects can venture into several areas and in different proportions, so their classification to those areas must be flexible and open to other options that may arise.

At the juncture of the XXI century of irreversible changes and technological advances, universities must leverage technology to support society and contribute to its development and improvement. The collaboration of teams with a common social interest in using digital technologies to establish effective and continuous communication networks stands out as the core axis of digital social innovations. Now is the time to follow up on the projects that emerged in response to the pandemic and make the pertinent current and post-pandemic updates and adjustments to achieve social change.

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The Main Product's Life Cycle as an Innovative Development Indicator of Enterprises

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Abstract: The innovation process can advance in two possible directions. The first one is the support of the already existing markets and products, which could be feasible in their relatively slow evolution. The second is developing products priorly absent at the market, which implies expanding market products diversity. In this paper, we were striving to find answers to the following questions: 1) Which of the two mentioned ways dominates the Russian industry? 2) To what extent are the difficulties with Russia's economic development, particularly the slowdown and stagnation of economic growth, affect the scale of this dominance? To answer the questions concerned, we studied the life cycle of industrial enterprises' main types of goods and services from 2007 to 2018. The stable or growing life cycle value is regarded as proof of the successful implementation of the first path, whereas its instability proves to implement the second direction. Special attention was paid to innovative-passive enterprises' behaviour. They strained to retain their main product life cycle until the external economic conditions deteriorated. In this situation, significant changes in the product life cycle showed up; this gave the reason to believe these enterprises temporarily moving into the class of innovative-active ones. We also figured out that the entire population of innovative-active enterprises could be divided into two groups. The first one contains enterprises whose strategy was to maintain the market product diversity (range) at the same level, which is equal to lengthening the main products' life cycle as long as possible. The second group comprised the enterprises to expand the product diversity (nomenclature) due to the radical innovation implementation, rather than at maintaining the life cycle unchanged. Besides, the latter group is characterised by an attempt to reduce the life cycle during the economic crisis. According to this study, the first group included large enterprises while the second united small and medium-sized units.

Keywords: product life cycle, innovation development, innovative-active enterprises, new product development time, population of enterprises

1. Introduction

The concept of the product life cycle is broadly discussed in modern scientific literature. Raizberg, Lozovskyi, and Starodubceva (2007) consider the life cycle when the product circulates on the market. This approach is also advocated by Romanov, Basenko, and Zhukov (2009). Kotler, Keller, and Cunningham (2006), in turn, suppose the following statements to be correct:

- a) The product life cycle is limited.
- b) Product sales are distributed unequally throughout the cycle.
- c) Various cycle stages require various product promotion strategies.

Generally, five major life cycle phases get a distinction: research & development, a product launch on the market, growth in sales, market maturity, and a sharp decline in sales (Orcik, Tekic, and Anisic, 2013).

During the first phase – the research and development of a new product – the magnitude of starting the product's sales is nearby zero. The company's revenue from the product sales does not cover the cost of production yet. Simultaneously, the costs of developing and improving the quality of the product remain very high. These factors combined lead to significant losses and instability of the enterprise.

The second phase – the product launch on the market – is determined by the commitment to winning over the consumer, i.e. creating a customer base for this particular product. It is proved by a high percentage of the innovator company's costs to the marketing promotion of the product. The phase of significant growth in sales follows by the second phase. Within this stage, marketing activity and product modification, which give an enterprise a chance to retain the existing technological advantage, are carried on.

At the fourth phase – the phase of the market's maturity – the growth in competition leads to the market saturated with various product modifications. The number of competitors stabilises, product sales and profit margins are at the peak, and the cost of new customers' attraction reaches a minimum (Prasad, Jha, and Verma, 2019).

The final (fifth) stage – market squeeze – is characterised by many competitors and decreased product attractiveness for the customer. A gradual decline in product sales is also being noted. It is worth adding that the scientific community widely perceives the life cycle as a set of consecutive non-intersecting phases (Cao and Folan, 2011).

It is worth mentioning that upon getting into the maturity phase, the company strives to cling to it as long as possible to avoid the transition to the market squeeze phase. To achieve the just-mentioned goal, an enterprise attempts to either reduce the production costs of the existing product range or improve the product quality and attract and win over new groups of consumers. By such means, the company can support and even solidify the market demand for the product. Should these efforts prove unsuccessful, and the advent of the market squeeze phase becomes a grave threat, the enterprise would face the task of attracting auxiliary market demand through significant (sometimes radical) shifts in product quality and range.

In other words, the end of the maturity phase is already the right time to discuss fostering the enterprises' innovative activity, which we can do by following each of the two key directions. The first way is to focus on maintaining and incremental improvement of already existing products and markets. In this case, we talk about their slow evolution. The alternative solution consists in aiming to transform the old markets and create new ones. The activity should result either in the launch of new products on the market or expanding their diversity or forming a new market (Perilla Jiminez, 2019).

Both types of the innovation process, described above, usually develop in one of two following ways:

- 1) Process innovation and incremental product improvements (or both simultaneously)
- 2) Radical product innovations (introduction of new products, product range extension, a substantial transformation of the old market or creation of the new ones).

There are several approaches to define these types of innovations. The most common among them is the so-called enterprise-level approach, which implies that a new (or considerably improved) product of some enterprise could be regarded as a product innovation, whereas a modification of the production process (without any significant product change) is called a process innovation (Simonetti, Archibugi, and Evangelista, 1995). Priorly, another way of defining those notions was in place. That time one could designate product and process innovations in terms of the “first use”. In this context, an innovation concerned could be considered product one only when it “goes beyond” (i.e. used outside) the innovation creator-enterprise; other innovative activity that occurs only "inside" the innovator firm leads to the creation of a process innovation only. From the consumer's perspective, product innovations aim to meet demand from the start. In contrast, process innovations have to be mainly focused on enhancing production means rather than on the final product. Nowadays, product innovation is unanimously perceived as a new product, either for the company itself or for the outside world, i.e. a local, national or international market (OECD and Eurostat, 2018).

Thus, the product life cycle's stable or slowly growing value is an indicator of the company's success in implementing the first direction of innovative development. In contrast, the indicator value instability may prove the enterprise to be endeavouring to follow the second. To pursue the first, primarily process, and incremental product innovations are put into use, whilst radical product innovations are utilised to sustain the other.

In this paper, we seek to find answers to the following questions: 1) which of the two mentioned innovative activity directions dominates the Russian industry? 2) how much do Russia's economic development difficulties, the slowdown and stagnation of economic growth particularly affect the scope of this dominance?

To answer these questions, we are to research the dynamics of the Russian industrial enterprises' main product’s average life cycle. We stressed the enterprises that carried out innovations (so-called innovative-active) and ones that did not (they are called innovative-passive). The study will also examine the populations of large enterprises (from 250 to 999 employed, 1000-4999 employed and more than 5000 employed) separately from

medium (100-249 employed) and small ones (99 employed or fewer). The data source is the form of the federal state statistical observation No. 4-innovation "Information on the organisation's innovative activity." In the data analysis, we calculated the value of the product life cycle indicator and the new main product's development time (the latter – solely for the enterprises that carried out technological innovations) - the time elapsed before replacing the old product with a new one.

2. Research methodology

We analysed the life cycle of industrial enterprises' main goods and services from 2007 to 2018. Constantly growing values of the product life cycle indicator match the successful retention of the already existing products. In its turn, unstable indicator values' dynamics imply implementing the second innovative activity direction. We have put under research the life cycle for various populations of enterprises. Namely, the study was carried out for the classes of large (250-1000, 1000-4999 and more than 5000 people employed), medium-sized (100-249 employed) and small enterprises (fewer than 99 employed).

The life cycle indicator has been calculated as follows. At the first stage of calculations, for each size class at a given period, we calculated the average "life" of the main product through statistics, which allowed us to divide enterprises of each size into five groups by the lifetime of the main product: 0-1 year, 2-5 years, 6-10 years, 11-20 years and more than 20 years respectively. For each group, we introduced the average life indicator of its main product: 1 year, 3.5 years, eight years, 15.5 years, and 20 years, respectively. Furthermore, each size class's main product's average lifetime was determined as a sum of the life indicators of their main product of these five groups above, taken with their particular weights in the class. The group's share in a class was defined as the group's share in the total number of organisations within the concerned class. At the second stage, the main product's life cycle was derived for the united set of classes as a whole. To do this, we calculated the share of each classes' production among the products manufactured by all classes combined. We then summed up the average life cycles of classes with these counted weights, which gave us a weighted average life cycle indicator.

3. Behavioural models of enterprises' populations in the context of the economic crisis

In this section, while considering typical models of enterprise's response to the economic crisis, we distinguish two types of their populations. They are classes of large enterprises and small and medium ones.

3.1 Large enterprises

Among large innovative-active enterprises, ones with the number of employees within 250-999 people amount to about 13% of produced goods and services in the total sales. A subclass with 1000-4999 employees accounts for about 48%. In contrast, the enterprises with more than 5,000 people employed contribute almost 26%. For innovative-passive enterprises, i.e., not implementing any technological innovations, the share of large enterprises' sales (data for 2018) is nearly 68%, including 36.4% (250-999 employed), 27.3% (1000-4999 employed), 4% (more than 5000 people employed). Innovative-active large enterprises, namely the class with more than 5000 employees, responded to the 2008 crisis by a significant increase (by 6%) in the average life cycle of the main product in 2009. However, a three-year drop followed this dynamics of the average life cycle of the main product (Figure 1). Generally, this decrease was limited to 2% from the level of 2009 in 2012. Generally, this decrease was limited to 2% from the level of 2009 in 2012.

Within this period, the time spent on developing a new product grew and limited the enterprises' ability to increase the principal product life by enhancing its nomenclature (Figure 2).

Nevertheless, from 2013 to 2017, one can observe an increase in the indicator mentioned above to 108% out of the 2008 level. This time, the stable nature of the dynamics and gradual growth of the life cycle indicator makes one think that during these years the innovation process took the shape of slow evolution aimed at maintaining existing level of production and retention of the already existing markets. Generally, the class demonstrates the progressive dynamics of this indicator over the concerned years. The overall growth over the entire period amounted to about 7-8% of the 2008 level. It is worth mentioning that this gradual hike required a 20% increase in product development time by 2018 (Figure 1).

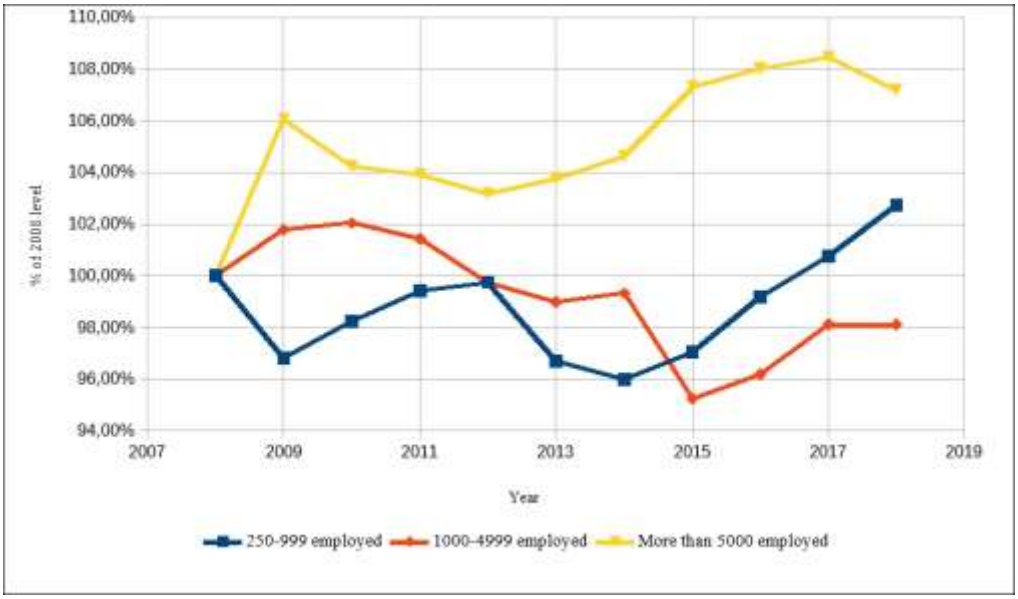

Figure 1: Main product's life cycle growth rate for large innovative-active enterprises

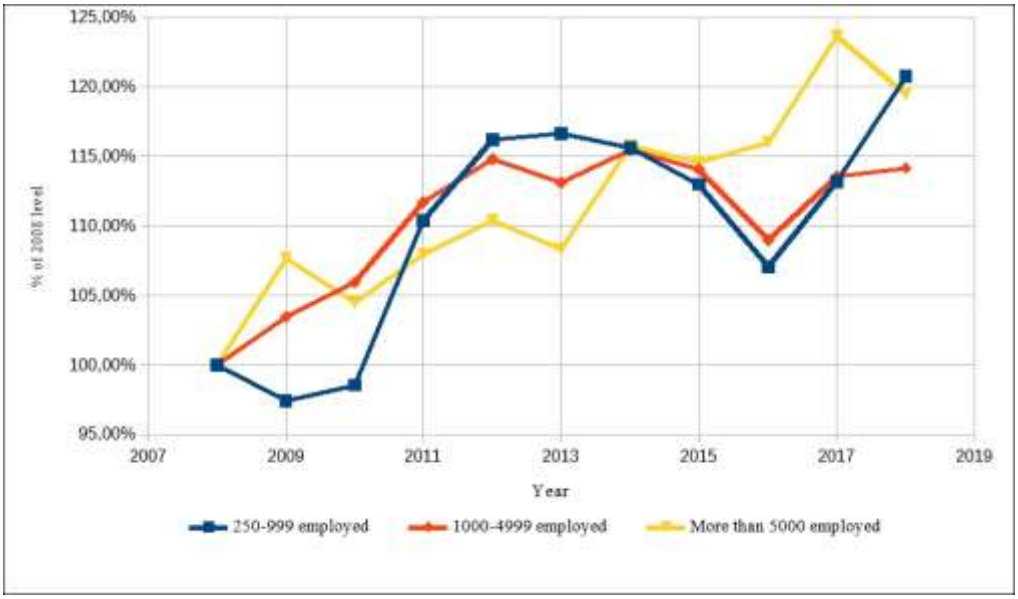

Figure 2: New main product's development time for large innovative-active enterprises

Stable positive growth, which both indicators reach in 2013-2017, indicates a primary focus on the gradual improvement of the existing main product, which implies the evolutionary type of innovation.

As for innovative-passive enterprises with 5,000 or more employed, the main product life dynamics appears to be notably worse (Fig. 3). It would be enough to say that merely within 2012-2014, the life cycle indicator had fallen by almost 10%.

Should we apply this approach to enterprises with 1000-4999 employed, we will get a picture quite different. This subclass of large enterprises (dominating by output among innovative-active ones) in 2008-2011 shows a slight increase in the main product's life cycle (Figure 1). Concurrently, up to 2013, this process was accompanied by the extension of the new product's development time. The latter implies that this class's enterprises are prone to maintaining the already mastered main product's life cycle as their priority. The subsequent decline in demand for this product during the acute phase of the systemic crisis (2014-2016) turned out to be a significant hurdle towards tackling this problem, which resulted in a sharp decline in the main product's life cycle by 2015. This fall proved to be impossible to compensate fully in the years ahead. Attempts undertaken to switch to the new product's manufacturing failed since the time of the product's development had been decreasing slightly in 2014-2015, though showing an upward trend later on (Figure 2). It is worth noting that this innovative-passive

enterprises' class showed stable values of the main product's life cycle indicator. It was hovering around the 2008 level throughout the entire period under review.

Innovative-active enterprises employing 250-999 people addressed both the crisis of 2008-2009 and the sharp phase of the systemic economic problems in 2014-2016 with a decline in their life cycle with the indicator's succeeding recovery. By 2018 the growth accounted for 10% from 2014, whereas a 10% rise in the new product's development time's growth rate characterized the rebound period. Innovative-passive enterprises of this class demonstrated virtually no change in the life cycle indicator in relation to the level of 2008 throughout the researched period (Figure 3).

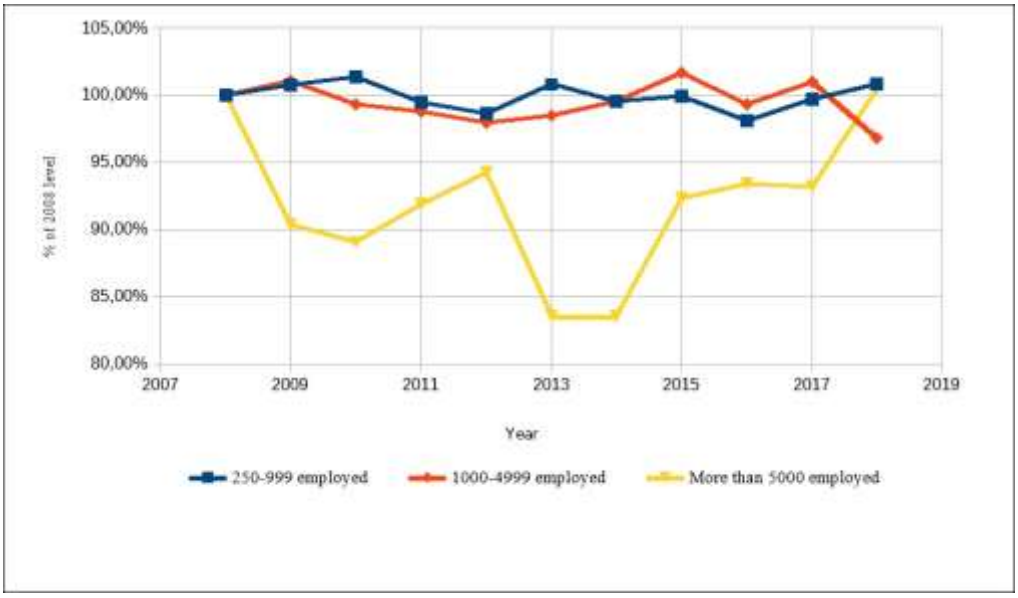

Figure 3: Main product's life cycle growth rate for large innovative-passive enterprises

Thus, the analysis performed allows us to draw two conclusions. Firstly, all three researched subclasses of large enterprises reacted differently to crises in the economy (accompanied, among other things, by a downturn in demand for the main product). It is corroborated by different dynamics of the main product's life cycle indicator in the reviewed subclasses. Secondly, the stability of life cycle growth indicators and the growth rate of development time majorly points out the evolutionary nature of the large enterprises' innovation activity, which consists in improving the existing product rather than creating a radically new one.

3.2 Small and middle-sized enterprises

The analysis shows two different types of small enterprises' reactions to crisis phenomena (Figure 4). At the first crisis (2008-2009), they were eager to increase the new product's development time (i.e. create a better new product to retain the consumer who experienced stagnation in real incomes). After a modest decline in this indicator's value in 2010, enterprises were extending the main product's development time until 2013 (the value of the indicator almost doubled with respect to 2010).

The upturn in development time reduced enterprises' ability to enhance their products, which led to a decrease in the main product's lifespan in 2011-2012 (Figure 5). By 2013, however, the situation had stabilised, and the life cycle value of the updated core product had returned to 2010 levels.

The enterprises' response to the downturn in 2014-2016 was quite the opposite: they strained to significantly broaden their products' diversity, increasing the time to develop the product and simultaneously reducing the main product's life cycle.

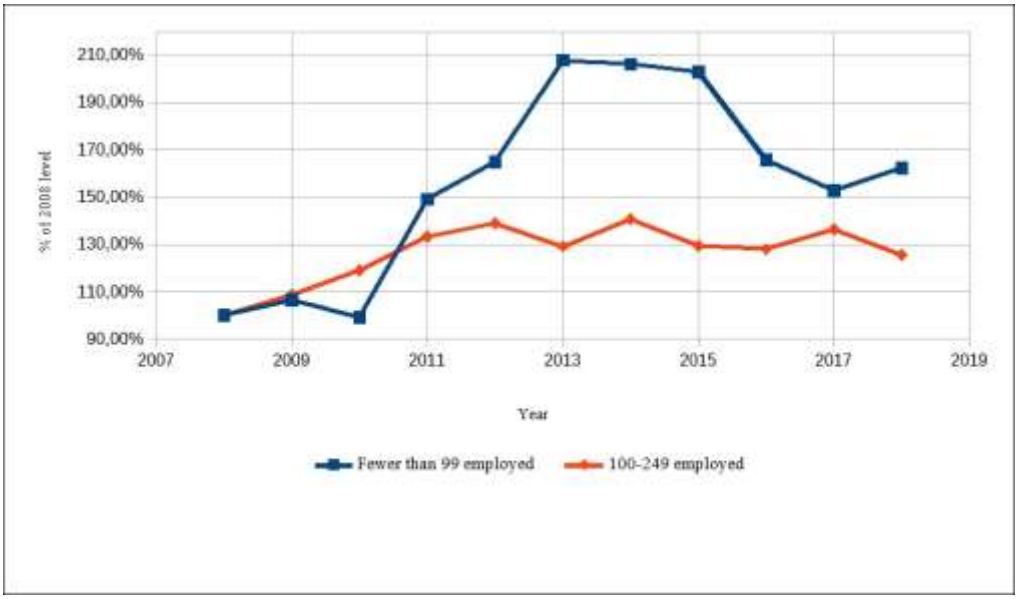

Figure 4: New main product's development time for small and medium innovative-active enterprises

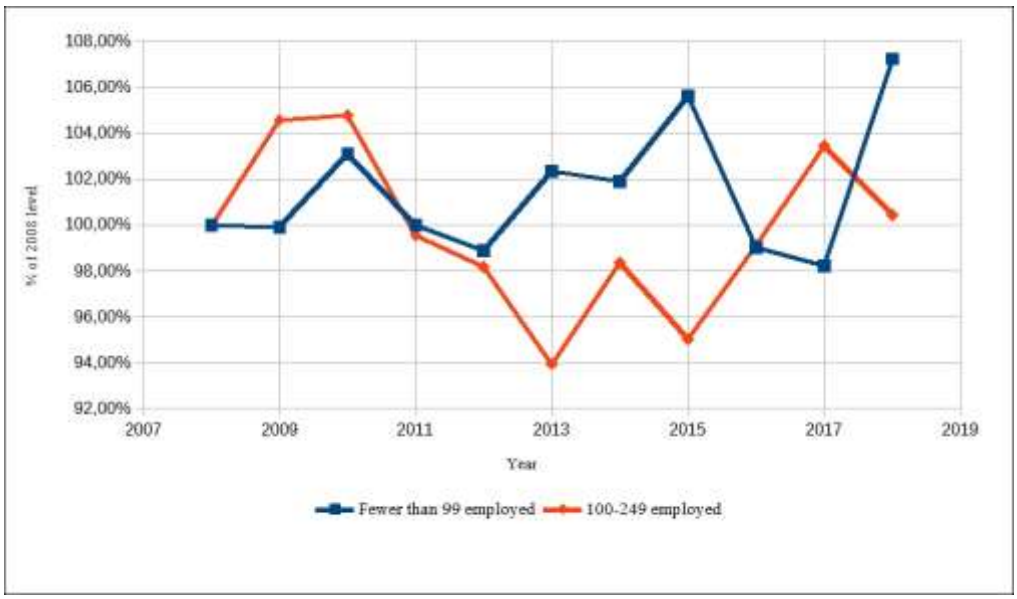

Figure 5: Main product's life cycle growth rate for small and medium innovative-active enterprises

There was a solid (for almost a third of the initial) cut in a new product's development time, which led to an acceleration of upgrading the enterprises' main products. Finally, these circumstances resulted in a 4-5% contraction in the main product's lifetime.

Innovative-passive small enterprises in the reviewed period showed no aspiration for significant modernization of the main product, which is confirmed by the stable shape of a life cycle indicator curve (Figure 6).

Next to small enterprises, namely, enterprises with 100-249 employees, demonstrate a slightly different innovative behaviour. Their life cycle indicators and product development time dynamics reveal the difference (Figures 5 and 6).

Despite the sharp contraction in the economy during the acute phase of the crisis of 2008-2009, these enterprises succeeded in maintaining the lifetime of the main product (sometimes even in increasing it). Simultaneously, just like small enterprises, in 2009-2012, they prolonged the time for new product development.

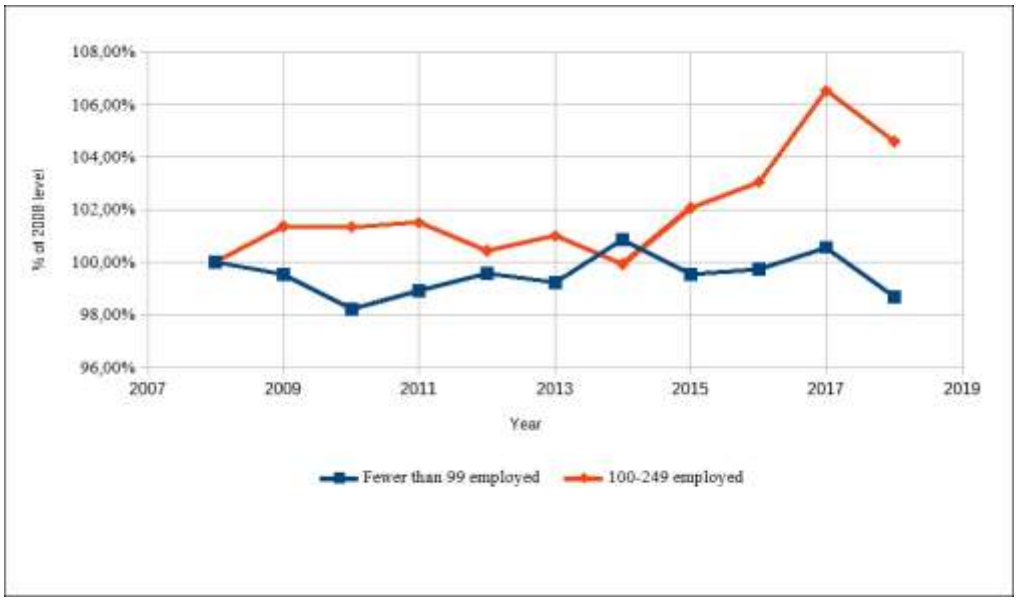

Figure 6: Main product's life cycle growth rate for small and medium innovative-passive enterprises

Additionally, this process's scope concerning a similar one among small enterprises was less distinct, yet very substantial statistically (the development period by 2013 increased by more than 35% from the pre-crisis level, which amounted to about 3-5 months in absolute values). This strategy's purpose was to replace the main product with a new or significantly improved one. The strategy's success is evidenced by the shape of the lifetime rate curve, which reached a local minimum after 2010; in 2013, the life cycle rate diminished by more than 12% as to 2008.

This class's reply to the 2014-2016 crisis was different from one in 2008-2009. In 2014-2016, there is no upward trend in a new product's development time. On the one hand, it designates the absence of noticeable efforts to replace the obsolete main product with a considerably (radically) improved one. On the other hand, it is a clear evidence of exerting efforts towards alleviating the maintenance of the previous main product's life cycle due to its incremental enhancement and shortening of production costs (i.e. process innovations). This conclusion is confirmed by the dynamics of the main product's life cycle indicator – it got back to the 2008 level during 2015-2018.

Innovative-passive enterprises employing 100-249 people handled the declining consumer demand, accompanying crises, via undertaking efforts to maximize the maintenance of the existing main product on the market; after 2014, the product lifetime indicator grew by about 5%. Since these enterprises were not involved in technological innovations, they most likely used other methods of supporting the main product's life cycle (e.g. marketing). However, later the enterprises depleted their available options for using non-innovative methods to support the life cycle and could temporarily turn into innovative-active ones.

4. Comparative characteristics of different populations' behaviour models and their interconnection

The deterioration of Russia's economic development indicators in 2008-2018 directly affected the end consumers' effective demand. Early on, we emphasized multiple types of Russian enterprises' modes concerning their way of fighting descending sales. These kinds of behaviour significantly depended on the strategy chosen by the observed population of enterprises. As part of one of these strategies, manufacturers faced a task of retaining main product demand from the consumer experienced a decline in real income or curbing the fall in this demand. Additionally, a somewhat different strategy seems possible as well. It is occuring when one cannot prevent a substantial drop in the main product demand. Thus, the enterprises might not see a solution in maintaining the life cycle of the prior product. Instead, they are more likely to enter (or establish) new markets, which follows the new leading product development and implementation. The first of them was generally adhered to by large enterprises. The second strategy, in turn, was more typical of small and medium-sized ones. Basically, a comparison between innovation-active and innovation-passive populations of small and medium-sized enterprises shows that the development and implementation of innovations reduce the life cycle by about

5% for the innovation-passive ones. Hence, the innovative activity of populations of Russian small (and, to some extent, medium-sized) enterprises is seemingly pointed not at maintaining the already existing life cycle of essential goods but rather at reducing it. Thus, innovative-active enterprises supposedly focus more on producing and promoting new products to the market.

Ultimately, it is precisely the populations of small (and medium) enterprises that serve as drivers of growth in the variety of goods and services on Russian markets (Golichenko and Popov, 2020). Enough to say that life cycle values for small and medium innovative-active enterprises fluctuate within 7.5-9 years. The life cycle of the main product of innovative-active large enterprises stands in 10-15 years. New product development time differs significantly too. For small and medium-sized ones, the indicator's value hovers from several months to a year. In contrast, large enterprises show the life cycle value estimated in years from two to twelve.

The results obtained in this study are similar to those of Fritsch and Meschede (2001). They earlier pointed out that small enterprises spend on product innovation much higher share of R&D expenditures than larger ones. The innovation activity of the latter usually came down to process innovations. Simultaneously, Fang (2009) insists that large enterprises on competitive markets are more likely to profit from creating their own product innovations. Moreover, some above-mentioned papers show that innovative-active small enterprises are more eager to implement radical innovations than large ones, in spite of the fact that, as Kijkasiwat and Phuensane (2020) state, small and medium companies face remarkable difficulties in accessing external finance. This proneness reflects an increased share of R&D expenditures in contrast with large companies

Things change significantly regarding the share of enterprises involved in innovative activities: the proportion of innovative-active units for large companies is almost twice more significant as for small and medium-sized ones (Robbins and O'Gorman, 2016). Our findings from this study prove to be closer to the just-mentioned article. However, this strategy of small and medium-sized enterprises' behaviour had no notable impact on the strategic choice of innovative-active enterprises in Russia. One may explain it by the resource dominance of large enterprises among innovative-active ones (as well as in the economy). It would be enough to say that the number of employed for small and medium innovation-active enterprises is ten times lower than one for innovative-active large companies. Consequently, large enterprises (hiring more than 250 people) in 2008-2018 dominated the innovative-active classes in the volume of products manufactured. The size class employed 1000-4999 people manufactures almost half of the produced goods among all enterprises combined. Consequently, the widespread strategy of innovative-active enterprises' behaviour came down to tackle the problem of maintaining or limiting the decline in demand for the main product during the crisis years. Concurrently, some researchers, for instance Mashal (2017), and Chege and Wang (2020), indicate the significance of the innovative activity of small and medium enterprises in developing countries' economies and assert that innovations bring higher growth rates of both revenues and diversity of products. However, this situation has no connection to the Russian economy, which is characterized by strict government supervision over the large (especially, state-owned) firms more like Chinese (Jia, Tang, and Kan, 2020). The state financial support of large enterprises usually takes place at the expense of maintenance of SMEs' innovative activity, which is narrowed to only their own meagre resources.

During the 2008-2009 crisis, enterprises' innovative processes aimed at preserving demand for the main product (i.e. at its slow evolution) turned out to be quite effective (Figure 7); the dynamics of the average life cycle confirms it. In the context of crisis, by 2009, this figure increased by about 3% compared with 2007. In subsequent years a fall of a moderate depth appeared. The most significant decline in 2015 accounted for only 0.5% of the 2008 level. In 2016-2017 the life cycle increased and exceeded the 2008 level. In 2018, we see a slight drop in the life cycle, while its value still higher than the values of 2008. The enterprises achieved the results simultaneously with growth in a new product development time from 6.7 years to 7.3 years. At the same time, innovative-passive enterprises tried to come up with a solution to the trouble. However, they seem to make no strides on this path. The research period showed a significant downward trend in the main product's average life cycle (Figure 7), with the largest drop (by 6% from 2008) in 2014. During the period of slow growth in the life cycle in 2018, the indicator slightly increased and reached 94.5% of the 2008 level, which generally did not change the dominating downtrend.

Summarizing those above, we can underline two circumstances:

- 1) The driver of the variety of goods' growth on the market wields merely a tiny influence on the Russian innovation processes since the degree of innovative activity of small and medium-sized enterprises is immensely lesser than the magnitude of similar activity in large enterprises;

- 2) The innovative activity of Russian enterprises is more aimed at maintaining existing goods rather than at expanding their diversity. The use of innovations allows enterprises to prolong the main product's life cycle significantly.

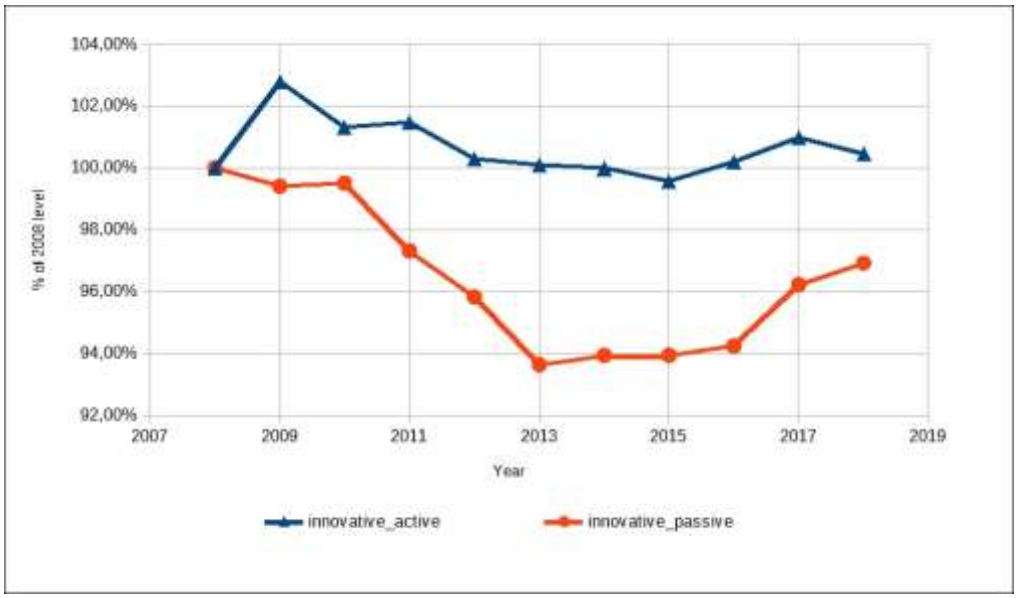

Figure 7: Main products' life cycles' growth rates of enterprises

5. Conclusion

Thus, in carrying out this research, we found that the entire population of Russian innovative-active enterprises can be divided into two groups by the type of their innovative behaviour. The first one is comprised of enterprises that tried to maintain an existing diversity of goods. The core idea of their strategy converged on the facilitation of the manufactured products' slow evolution to maintain the existing market via prolongation of the main product's life cycle. To attain it, enterprises were exerting efforts towards fostering the main product's incremental improvements or utilising process innovations. The second group included enterprises aspired not to retain the previous market by maintaining the life cycle of the leading products manufactured but to expand the variety (nomenclature) of manufactured products. This goal demanded the implementation of substantially advanced (radical) innovations. One of the outcomes of this strategy's implementation consists in reducing the life cycle of manufactured products.

The study showed that the main product's slow evolution was conducted by large innovative-active Russian enterprises (subclasses employing more than 250 people). Thus, responding to the 2008 crisis, innovative-active enterprises with more than 5,000 employees managed to significantly increase (by 6%) the main product's life cycle. In the context of systemic crisis after 2013, they encouraged growth in this indicator to 108% from the 2008 level. In their turn, small and medium innovative-active enterprises reacted to both the 2008-2009 and the systemic crisis that erupted after 2013 via adherence to a more radical type of innovative behaviour, which is namely the second type of innovation strategy. Furthermore, from 2010 to 2013, enterprises employing up to 99 people raised their new main product's development time to the level twice as high as early on. At that period, the life cycle values were fluctuating around 102-103% of the 2008 level and in absolute terms amounted to 7.5 – 8.5 years.

It is important to note that the impact of the "innovative" nature of small enterprises' innovative activity on the Russian economy scale is of strictly limited importance. This statement derives from the large enterprises' dominance in the Russian economy as a whole and among the innovative-active ones. It would be enough to say that manufactured products of large innovative-active enterprises account for about 87% of all innovative-active ones. Hence, we can count an evolutionary type of innovation activity as prevailing in the economy.

Finally, one cannot neglect to mention the peculiarities of the innovative-passive firms' behaviour in crisis years. For these enterprises, the main product's life cycle had remained steady until a significant deterioration in their activities' external economic conditions transpired. The enterprises then responded with a significant drop in product life cycle, which proved their willingness to transition into the category of innovative-active ones. To the greatest extent, this model of behaviour matched innovative-passive large enterprises employing more than 5,000 people.

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Assessing the Participation and Success of Women Entrepreneurs in Unicorn Startups

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Abstract: Over the last decade, the term "Unicorn" has captured a great deal of attention in the startup ecosystem. Unicorn startups are that elite group of privately-owned companies that have achieved a valuation of at least USD 1 billion. This fast-growing category of highly valued startup has caught the attention of many in recent times with the number of Unicorns nearly quadrupling in just two years, from around 140 Unicorns in 2018 to approximately 600 by the end of 2020. Despite the high growth in this category, the representation of female-founded (companies with at least one female founder or co-founder) Unicorn startups still remains at less than ten percent as of 2020. Very limited examination has been done of the success or failure of Unicorn startups or on the role of women in these high growth ventures. As part of a wider project examining the contributing factors influencing the success or failure of Unicorns, this study examines the role of women in Unicorn startups, assessing the level of participation of women in the creation and management of these startups, either as a founder or a member of the senior management (VP or C-suite level). This study provides an improved understanding of the role of women in the formation of Unicorn startups, and investigates the contributions of, and barriers faced by female entrepreneurs in these high value startup journeys.

Keywords: female founders, Unicorn startups, female-founded startups

1. Introduction

Unicorn startups, coined by the venture capitalist Aileen Lee in 2013, are that elite group of privately-owned companies that have achieved a valuation of USD 1 billion or more. Although Unicorn startups were not very common until 2005, the recent growth in Unicorn startups has been quite remarkable having nearly quadrupled in just two years, from around 140 Unicorns in 2018 to approximately 600 by the end of 2020 (Crunchbase, 2021). Also, at least 130 startups have lost that status since 2005 (Statista, and Crunchbase, 2021). Despite the high growth in this category, the representation of female-founded (companies with at least one female founder or co-founder) Unicorn startups is reported to be less than ten percent as of 2020 (Diaz-Ortiz, 2020). Very limited examination has been done of the success or failure of Unicorn startups or on the role of women in these high growth ventures.

As part of a wider project examining the contributing factors influencing the success or failure of Unicorns, this study examines the role of women in Unicorn startups, assessing the level of participation of women in the creation and management of these startups, either as a founder, or a member of the senior management (VP or C-suite level), and presents lessons learned from a few selected case studies identifying role models that can support a better understanding of the contribution of women in Unicorn startups..

This paper provides an improved understanding of the role of women in the formation of Unicorn startups and presents a comparative analysis of female-only founded Unicorns with other groups for a better understanding of the contributions of, and barriers faced by, female entrepreneurs in these high value startups.

2. Literature review

Research on women entrepreneurship over the years have primarily focused on the restrictions and/ or empowerment of entrepreneurial activities caused by of the gender of the entrepreneur (Bird and Brush 2002; de Bruin et al. 2007; Jennings and Brush 2013). According to Lim & Suh (2018), women are less likely to start a business or become a founder of a business in comparison to men for several reasons. Women usually have fewer perceived opportunities to start a business compared to men (Gupta et al. 2009; Hughes 2003). Moreover, after launching a business, female-founded ventures experience more difficulties in finding access to the necessary resources, including funding, to run their business. Although women entrepreneurs are able to sustain their businesses with less money than men (Also et al. 2006; Boden and Nucci 2000), women entrepreneurs are much less likely to get venture capital funding because of the existing gender bias (Brush et al. 2014).

Prior studies have confirmed that it is a major challenge for women to acquire venture capital funding for their startups, with women founders generally raising around 70% less funding than men entrepreneurs (Seligson, 2012). It is also suggested that male entrepreneurs have an edge over women entrepreneurs when it comes to raising capital for their startups, whether it is equity funding through venture capital (Bigelow et al., 2014), private equity funding (Becker-Blease and Sohl, 2007), or debt financing like bank loans (Buttner and Rosen, 1988; Eddleston et al., 2016; Fay and Williams, 1993). According to Canning et al. (2012), women-led firms receive little over one percent of the total venture capital funding.

It is also likely that women entrepreneurs have to give up a higher percentage of their company equity compared to male entrepreneurs when seeking funds from investors (Becker-Blease and Sohl, 2007). Other studies suggest that women-led ventures make less profit, demonstrates slower growth, and are usually smaller in size compared to male-led ventures (DuRietz and Henrekson, 2000; Hisrish and Brush, 1984; Kalleberg and Leicht, 1991). Hassan et al. (2020) mentions that women are often subjected to unfair bias from the venture capital firms, preventing them from negotiating a fair deal and resulting in a slower early-stage growth for their startups.

Despite the many obstacles, the number of female founders as well as the amount of venture dollars invested in female-founded startups have both continued to grow since 2010. According to Crunchbase (2020), around $27 billion was raised in 2019 by startups with at least one women co-founder, with $21 billion going to startups including at least one female co-founder and the remaining $6 billion raised by female-only founded startups. This indicates an eight-fold growth in investment in the female-founded or co-founded startups. Since 2010 (Crunchbase Inc., 2020) The same Crunchbase report suggests that one in five startups that raised their first funding round had at least one female founder. This number is double from what it was in the year 2009. In 2015, around 5,300 startups with at least one female founder were able to confirm the first round of funding, which has nearly doubled to almost 10,000 startups securing their first funding round in 2019. Although the female-only founded startups have been able to attract around two to three percent of the overall venture capital funding over the last ten years, the startups with a combination of both male and female co-founders have been able to secure around nine percent of the total venture capital investment since 2013. (Ang, 2021)

Initial evidence on the prevalence of women founders in Unicorns is sparse. However it has been suggested that starting from a very low baseline, the number of Unicorns that have been founded or co-founded by at least one woman has grown significantly in recent years. (Ang, 2021). Table 1 shows the most successful women founders in terms of funds raised.

Table 1: List of top 10 female founders with the highest funding raised from VCs

Female Founder	Unicorn Startup	Funding Raised	Industry	Country
Lucy Peng	Ant Group	$22B	Financial	China
Rebekah Neumann	The We Company	$19.5B	Real Estate	U.S.
Tan Hooi Ling	Grab	$9.9B	Transportation	Singapore
Kate Keenan	Judo Bank	$1.4B	FinTech	Australia
Victoria van Lennep	Lendable	$1.2B	FinTech	United Kingdom
Cristina Junqueira	Nubank	$1.1B	FinTech	Brazil
Frances Kang	WeLab	$581M	FinTech	Hong Kong
Sophie Kim	Market Kurly	$282M	Agro & Food	South Korea
Ilise Lombardo	Arvelle Therapeutics	$278M	Biotech & Health	Switzerland
Milda Mitkute	Vinted	$260M	Ecommerce	Lithuania

Source: https://www.visualcapitalist.com/top-female-founder-in-each-country/

Among some of the notable female-founded startups achieving the Unicorn status in 2019 were two New York based startups, Away and Glossier, both closing $100 million in Series D funding that year and breaking the one-billion-dollar valuation barrier (Ang, 2021). Crunchbase's (2020) published database of Unicorn startups reports that Lucy Peng, the founder of Ant Group, is worth $4.8 billion with 2.1% ownership in a company that has raised $22 billion in funding from different VCs (Neufeld, 2020).

Research Questions

Given the well documented lower participation of women than men in entrepreneurial activities and the identification of the many barriers they face in the early stages of their startups, this research project examines

whether these obstacles persist even when their startups have achieved the apparent success of being recognised as having high growth potential and receive significant investor support. As a first stage in the project, this paper develops a baseline for future investigation by addressing the following research questions.

- What is the level of participation of women as a founder or co-founder in Unicorn startups?
- To what level do women founders contribute to the funds raised by a Unicorn as well as the company valuation?
- What role do women play in the female-founded Unicorn startups?
- Do the industries in which female -founded Unicorns emerge differ from other Unicorn startups?

3. Study methodology

3.1 Approach

The study is based on the use of secondary data, drawn from a number of sources. A database was constructed to contain all Unicorns identified as of March 31, 2021. This includes both current Unicorns and Unicorns that have been previously identified but are no longer described as Unicorns, whether because of a reduction in value or a successful exit. The database is intended to be the foundation for a number of studies. For this study, the key data elements used were:

- Company identification
- Most current valuation
- Funding Rounds/Total Funding Amounts
- Number of founders
- Presence of women as either founders or top executives.

3.2 Primary data sources

For this study, the Unicorn database created by the private research company, Crunchbase, was used as the foundation. This identified all the active Unicorn startups as of March 2021. In addition, a list created by CB Insights was used to verify the primary list of Unicorn startups and collect the last known valuation of the Unicorn startups. A total of 713 active Unicorns were identified.

3.3 The analysis

From the 713 active Unicorns, 73 Unicorn startups with the presence of at least one female founder were identified. Next, a basic descriptive analysis of the overall Unicorn startups was performed in comparison to the Unicorn startups with presence of female founders. Two broad clusters, and two sub-clusters were formed, as shown in Figure 1, to allow a comparative analysis using four parameters – number of founders, company valuation, total funding rounds, and total funding amounts.

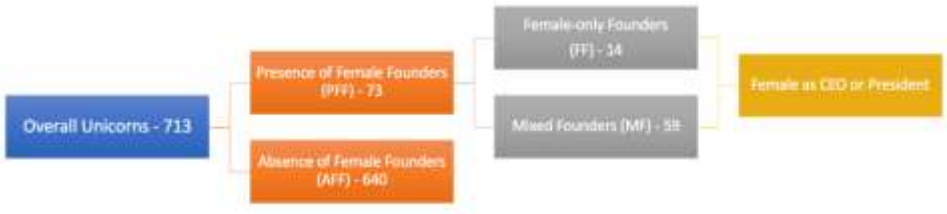

Figure 1: Breakdown of the clusters used for comparative analysis

The 713 Unicorns gathered from the existing Unicorn startups were examined overall and in two broad clusters and two sub-clusters or groups:

- *Overall Unicorns:* 713 Unicorn startups
- *Presence of Female Founders (PFF):* 73 Unicorn startups that have at least one female as a founder or co-founder
- *Female-only Founders (FF):* 14 Unicorn startups that have only female founders or co-founders

- *Mixed Founders (MF):* 59 Unicorns that comprises of both male and female co-founders
- *Absence of Female Founders (AFF):* 640 Unicorn startups that have no female as founders or co-founders

The combination of the Female-only Founders (FF) and Mixed Founders (MF) are considered to be Unicorns with presence of female founders (i.e., with at least one female founder or co-founder, N = 73).

A comparative analysis with these clusters or groups were performed with respect to the following four parameters –

- *Average Founders per Unicorn:* Total number of founders in a category divided by the number of Unicorn startups in that category
- *Average Valuation:* Combined total valuation of the Unicorn startups in a category divided by the number of Unicorn startups in that category, measured in billion USD
- *Average Total Funding Amount:* Combined funding amount raised by the Unicorn startups in a category divided by the number of Unicorn startups in that category, measured in billion USD
- *Average Funding Rounds:* Total funding rounds by the Unicorn startups in a category divided by the number of Unicorn startups in that category

For the Female-only Founded (FF) cluster Unicorn data, because of an extremely highly valued outlier (the Ant Group, valued at $136 billion), many average numbers were greatly inflated compared to the other groups. Hence, for the analysis purpose we have shown both scenarios, one with and one without the outlying Ant Group.

In addition, for some Unicorns, Crunchbase did not provide a current valuation. In these cases, the Unicorn database from CB Insights was used to fill in the gaps. Finally, as a conservative approach, any remaining Unicorns, who did not have a current valuation, were valued at one billion USD. The Unicorn startups with Presence of Female Founders (PFF) were further scrutinized to identify the role of women in a leadership position in these organizations. The same four criteria were measured for the FF Unicorn cluster where women hold the position of either CEO, President or sole founder. Also, within the 73 PFF Unicorns, the number of female founders or co-founders holding a leadership position were identified. Finally, the industry breakdown for the FF Unicorn cluster was determined. In addition, regression analysis was used to determine if the total funding raised by the FF Unicorn cluster has any effect on the company valuation.

4. Findings and analysis

4.1 General overview of PFF Unicorns

An examination of the 713 active Unicorn startups shows that around ten percent (N=73) of these billion-dollar startups have at least one female co-founder, clustered under the term PFF. Of the 254 founders in these 73 PFF Unicorn startups, women make up around one-third (N = 92) of the total founders. Fourteen of these 73 firms are 100% female owned, grouped as the FF cluster. Overall, around six percent of the total 1566 Unicorn founders are female and around two percent of the Unicorn startups are solely owned by women. Nearly 80% of these 73 PFF Unicorns have only one female founder, with some 20% having two or more female co-founders. Table 2 below summarizes the 73 member PFF Unicorn cluster and compares them to the total set of current Unicorns.

Table 2: Summary of PFF Unicorns

Items	PFF Unicorns	Overall
Number of Unicorns with at least one Female founder	73 (10.2%)	713
Total Number of Founders in these 73 Unicorns	254 (16.2%)	1566
Total Female Founders/ Co-founders	92 (36.2%)	92 (5.9%)
Number of Funding Rounds	456 (11%)	4144
Total Funding Amount	$78.4B (13.5%)	$578.8B
Average Founding Year	2013	2012

Figure 2 below shows that the 2 years prior to the pandemic, 2018 and 2019, were the best years for the female-founded Unicorns (PFF group) with the emergence of a combined 36 new Unicorns with at least one female

founder or co-founder. In 2018, out of the 158 new Unicorns that were recorded, nearly 9.5% (N = 15) had at least one female co-founder. In the year 2019, of the 142 new Unicorns, 21 (around 15%) had at least one female co-founder. In 2020, the creation of new Unicorn startups fell a little to 120, with around eight percent (N = 10) having at least one female as a founder or the co-founder.

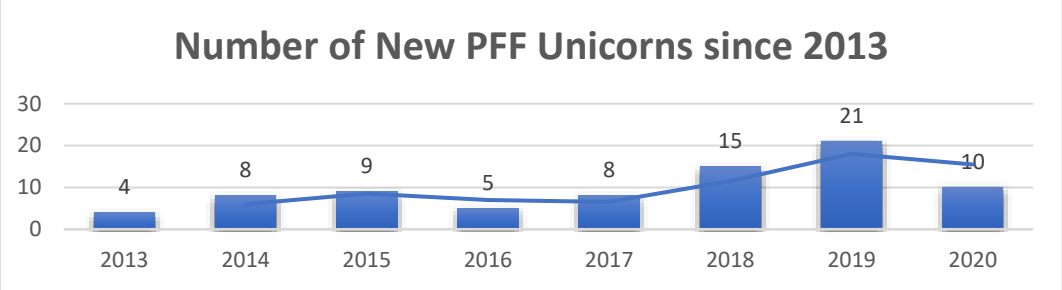

Figure 2: Number of PFF Unicorn Startups over the years

4.2 Average number of founders per Unicorn

Figure 3 presents the average number of founders. The 14 FF Unicorns with only female founder or co-founder have 19 women in total, an average of 1.26 founders, which is about half of the overall average founders per Unicorn. The average of the MF cluster consisting of both male and female founders is the highest of all groups with around four co-founders per Unicorn on average. AFF Unicorn starts have an average of just over 2 co-founders per startup.

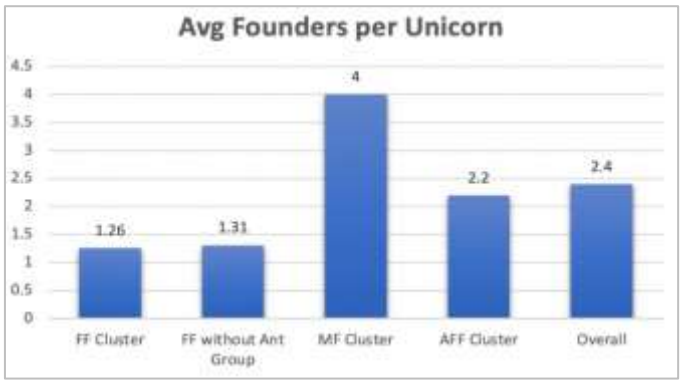

Figure 3: Average founders per Unicorn

4.3 Average valuation per Unicorn startups

The last known valuation figure was collected primarily from the CB Insights and Crunchbase databases. Where a current valuation amount could not be found, one billion USD was used as the default valuation. As can be seen in Figure 4, the FF group has the highest average valuation, largely because of the previously mentioned outlier Ant Group with a valuation of $136 billion USD. Taking this outlier out, the remaining 13 FF Unicorns have a valuation of just one billion USD each. By comparison, the MF and AMF groups all have an average valuation of around three billion USD.

Figure 4: Average valuation (in Billion USD)

4.4 Average total funding amount

An important criterion that contributes considerably to the valuation of these startups is the average funding amount received by the Unicorns. As Figure 5 shows, while the FF cluster Unicorn startups have the highest average total funding because of the outlier Ant Group, the average of the remaining FF group is the lowest among the four groups at 0.29 billion USD. In contrast, the MF cluster has the highest average funding amount of around 1 billion USD excluding the Ant Group from the calculation.

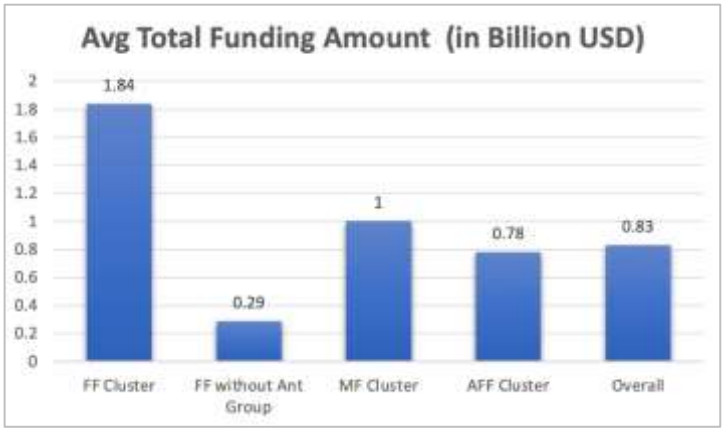

Figure 5: Average total funding amount (in Billion USD)

4.5 Average funding rounds

In considering the number of funding rounds, as Figure 6 shows, the MF cluster leads the group with an average of 7.5 funding rounds per startup. the FF cluster has a slightly lower average funding rounds, with an average of 5.5 funding rounds and around $5.3 million USD funding raised per round (without the outlier Ant Group). AFF and Overall Unicorn startup groups each average around 6 funding rounds, with average funding per round of around $13 million for all other clusters except FF group.

Figure 6: Average funding rounds

4.6 FF Cluster Unicorn startups

The FF cluster contains the fourteen Unicorns that are solely owned by women. Most (N = 9) of these 14 Unicorns are from the United States. There are 19 female founders or co-founders in these FF Unicorns, with 14 female owners holding the position of CEO, President, or the Managing Director. Other than one former female co-founder, every founder is actively involved in the leadership roles in these startups. The Female-only firms have raised a combined total of $25.8 billion USD; however, Ant Group alone has raised $22 billion USD of the total.

4.7 Women as leaders in PFF Unicorn startups

Among the 73 PFF Unicorns with at least one female founder or co-founder, 30 of the firms had women leaders as the CEO or President, but as discussed above, 14 of these are solely owned by women and 16 (24%) of the Mixed group have a female CEO or President. Almost 90% of the 73 female-founded Unicorn startups have at

least one woman playing an active leadership role, including CEO or President, C-level executive positions or Vice-president positions. 51 (around 86%) of the MF Unicorn group have women in active leadership roles, playing an important part in the day-to-day management of the company. In the Unicorn startups where women are (or were) holding the position of CEO, President or sole founder, the average valuation is around $6.1 billion, that includes the Ant Group ($2 billion USD excluding Ant Group). The average funding amount is the highest of among clusters at $ 1.27 billion USD among the four groups (including the Ant Group).

4.8 Industry breakdown of female-founded (PFF) Unicorns

An examination of the industry breakdown for PFF Unicorns shows that about two-third of these Unicorns are in only four industries: Beauty, Fashion & Lifestyle (19%), Banking & Finance (18%), Healthcare (15%), and Data Analytics, AI & Machine Learning (14%). However, as Figures 7 and 8 show, a major difference exists between FF and MF clusters. For FF Unicorns, the majority (57%, N = 8) belong to the Beauty, Fashion & Lifestyle industry category, followed by Banking & Finance (14%, N = 2) and Healthcare (14%, N=2). For the MF cluster, the highest industry representation is Banking & Finance (19%, N = 11), followed by Data Analytics, AI & Machine Learning (17%, N = 10) and Healthcare (15%, N = 9). Beauty, Fashion & Lifestyle is fourth on this list with 10% (N=6).

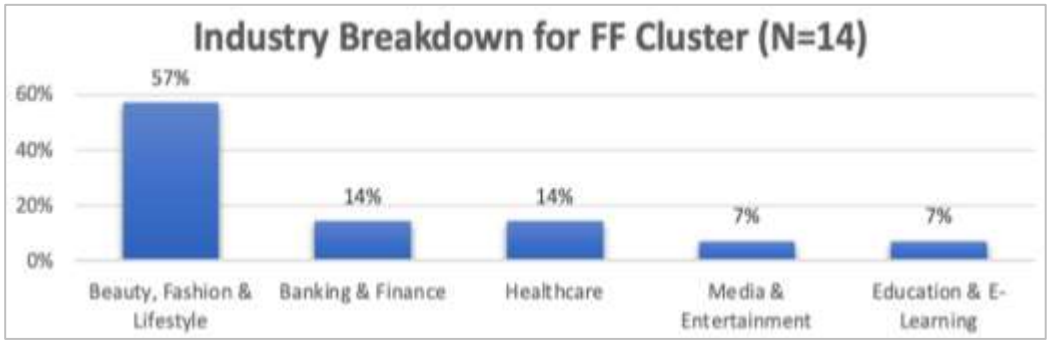

Figure 7: Industry breakdown for female-only founded (FF) Unicorns

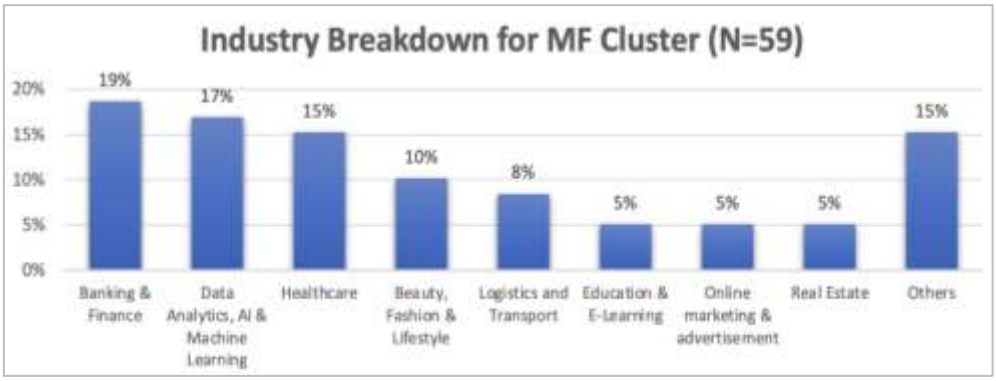

Figure 8: Industry breakdown for mixed group Unicorns

4.9 The relationship between total funds raised against firm valuation

A simple regression analysis, shown in Table 3, was performed to measure the effect of total funds raised on the firm valuation among the 73 PFF Unicorns. Results from the linear regression analysis indicated that total funding raised by the PFF Unicorns positively influenced the company valuation to break the one billion USD valuation to reach the Unicorn status, $t (72) = 15.57$, $p < .001$, $R2 = .78$.

Table 3: Regression analysis on the effect of total funds raised against firm valuation

Regression Statistics	
Multiple R	0.88
R Square	0.78
Adjusted R Square	0.77
Standard Error	8.03
Observations	72

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	15613.80	15613.80	242.35	0.00
Residual	70	4509.85	64.43		
Total	71	20123.65			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.28	1.00	-0.28	0.78	-2.27	1.71	-2.27	1.71
Total Funding Amount (in USD)	0.00	0.00	15.57	0.00	0.00	0.00	0.00	0.00

5. Discussion

As previously discussed, prior research has found that women entrepreneurs face more challenges than men, be it starting their own business or raising funds from external sources. The findings from this study confirms that these challenges remain even at the lofty levels of Unicorn startups. Women's representation as a founder or a co-founder among all Unicorn startups (N = 713) is less than six percent (N = 92), and in the MF Unicorn group (N = 59) where at least one co-founder is a woman, the woman representation is roughly one in three co-founders, with sixteen Unicorns holding the Chief Executive or President position in these startups.

Based on the four main performance parameters measured for this study, after excluding the outlier Ant Group from the calculations, it can be observed that Unicorns founded only by women entrepreneurs (FF cluster) lag behind across all four parameters when compared to the other groups. However, the MF group Unicorns seem to perform better than AFF Unicorns in most of the parameters.

PFF Unicorns where women hold an active leadership role are performing better than the other groups. With an average valuation of $6.1 billion and an average total funding amount raised at $1.27 billion (includes Ant Group), the PFF Unicorns where women hold the position of CEO, President or sole founder (N = 30) have the highest average compared to other clusters in these 2 parameters.

The average valuation of FF group (N = 14) was lowest at $ 1 billion and total funds raised at $ 0.3 billion. One of the primary reasons could be the industry where the FF Unicorns most frequently operate. Almost 60% of the FF Unicorns (N = 8) belong to the Beauty, Fashion & Lifestyle industry category, which may not be seen as scalable as other industry groups. Despite all these factors, the regression analysis does show that the funds raised by the help of women founders and co-founders did influence the valuation to break the one-billion-dollar mark and help these 73 PFF startups achieve the much-coveted Unicorn status.

6. Conclusions

This descriptive study comes at an early stage of our research project on the role of women in Unicorn startups, however it seems evident from our findings that significant differences exist between Unicorns without any female founders (AFF) and those that have both male and female founders (MF) or just Female Founders (FF).

The significant under-representation of women in the overall startup ecosystem, appears to be replicated in the rarified Unicorn world, with women making up only 6% of all founders and only 2% of all startups having female only founders (FF). This under-representation is even more evident in leadership roles. Despite women holding about one third of all leadership roles in MF cluster Unicorns, roughly one in four of them hold the Chief Executive or President position. Indeed, except for the few firms, it is only in the FF group that women hold the top position.

FF cluster Unicorns have lower valuations, and fewer founders than the other Unicorns. However, MF Unicorns have more founders and, across most dimensions seem to outperform the AFF Unicorns. When women hold a position of active leadership in the Unicorns, the firm performed better in terms of average valuation as well as attracting higher funding.

A marked difference was also observed in the Industry sectors in which the Unicorns participate. FF Unicorns are heavily concentrated in the Beauty, Fashion & Lifestyle industry.

7. Limitations

One of the major limitations of this study is the inconsistency found in the Unicorn lists published by different research organizations. For this study, we used the Crunchbase Unicorn startup database as the primary source, while drawing on CB Insight's Unicorn database. Another limitation was the currency of the most recent valuation of the Unicorns, and where it was not available, we had to assume the minimum valuation, which is $ 1 billion USD.

8. Next steps

The findings of this study are a foundation upon which to build a more detailed investigation of the women founders themselves, their motivations and experiences as well as their leadership roles. The intriguing findings around the MF cluster Unicorns also need further investigation, Finally, further examination of the role of investment firms in dealing with Female founded (PFF) Unicorns should be productive, as well as considering the level of participation of women as investors in the formation of Unicorn startups.

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Information Security Workshops During the COVID-19 Pandemic: Testing Experiential Analog Learning Scenarios

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Abstract: Although digital technologies that protect against threats have gained importance in globally networked institutions, the "human factor" in information security (IS) has not as yet been given sufficient attention. We will present the concept behind two online IS workshops that were designed and implemented as part of the project "Mittelstand 4.0—Kompetenzzentrum Stuttgart." The workshops served to test and subsequently evaluate two analog learning scenarios that address the issues of "social engineering" and "security risk management" for small and medium-sized companies. The learning scenarios were developed according to the principles of game-based and experiential learning and aim to raise the game players' awareness of IS over the long term. The purpose of testing during the workshops, which had to take place online owing to COVID-19 measures, was to finalize both learning scenarios for the client. For this purpose, the implementation of the scenarios was modified so as to be "online compatible." Such a "hybrid" workshop variant is proving indispensable in a digitally oriented society of the future.

Keywords: information security, awareness raising, game-based learning, analog scenarios, experience-oriented workshops, hybrid workshops

1. Introduction

Information security (IS) in all its many facets is a ubiquitous and inseparable part of digitization. Company investment in IS is essential. For example, Bitkom's study in 2020 shows that 75 percent of the more than 1,000 German companies surveyed had been affected by data theft, industrial espionage, and sabotage in the previous two years (Bitkom, 2020:7–8). When extrapolated to Germany's economy as a whole, this equates to annual losses of more than 100 billion euros (Bitkom, 2020:20–23). However, according to the survey by Ernst & Young (see Meseke & Kuhlee, 2019:7), the risk of becoming a victim of cyberattacks or data theft is still frequently underestimated by more than 450 German companies—with sometimes dramatic consequences, especially for small companies (Dreißigacker, Skarczinsik & Wollinger, 2020:141). Small and medium-sized enterprises (SMEs) are increasingly at risk from cyberattacks. But they rarely have commensurate IS protective measures in place (Schmidt, Gonolf & Haufs-Brusberg, 2018:3). According to KPMG India in 2015, most companies spend less than 5 percent of their IT budget on IS (Schmidt, Gonolf & Haufs-Brusberg, 2018:9). The representative survey by techconsult (2017) in Germany shows that—as an average across all companies—information technology (IT) security tasks only account for 10 percent of the IT spending and therefore a maximum of only around 3 percent of annual sales. A report by Datto (2019:10), an American company specializing in cybersecurity and data protection, uses the example of ransomware cyberattacks to show how high the true costs for companies are, based on the resulting downtime. The study by Hildebrandt et al. (2018:79) shows that many companies are only willing to spend money on IT security when actual damage has occurred and losses have already been suffered.

Awareness-raising measures are also affected by the low IT security budgets. Schmidt, Gonolf & Haufs-Brusberg (2018:4) argue that since security awareness almost always forms part of company standards, norms, and frameworks, there is a connection between the size of the company and the introduction or existence of awareness-raising programs. In SMEs, a common mistake is to invest primarily in IT technology while at the same time not paying sufficient attention to the *human factor* (Lacey, 2009; Luo et al., 2011:1). The human factor in IS has not been given sufficient attention in the last decades. The statement "There is no awareness of IT security" is at the top of the list of factors cited as barriers to more IS in SMEs in Germany according to a survey of experts (Hildebrandt et al., 2018:80). This is where our project comes in, because employees *with awareness* are a key factor in preventing successful attacks like spam, phishing, and social engineering (SE), and managers need to implement security risk management (SRM) and quantify cyber risks.

The development of the IS learning scenarios went through an iterative process of conception, concrete development, testing, and adaptation. Testing of analog scenarios is usually done with diverse target groups in creative and interactive analog workshops. However, under pandemic conditions this was an unknown challenge for the research team. The methodology of the feedback in our project consisted of responses from the client, smaller analog on-site tests with trainees and students in compliance the COVID-19 guidelines, and the oral and written assessments of volunteers from the nationwide IT security working group. However, the on-site workshops for testing the learning scenarios with the working group could not take place as planned. In order to receive feedback for the finalization of both learning scenarios from the IT Security working group, the implementation of both learning scenarios had to be redesigned to be online-compatible by also modifying parts of the content. The written feedback was carried out with the help of a questionnaire. Our experience is described in this article. Section 2 puts face-to-face and digital workshops in comparison. Section 3 presents the conception of our two online/"hybrid" IS workshops on the topics of SE and SRM, including game-based elements, technical aspects, and the evaluation method. The results and the feedback from participants are presented in section 4. The conclusion, and outlook are given in section 5.

2. Face-to-face and digital IS workshops in comparison

2.1 Workshops for awareness raising in IS

One might think that in an evolving digital world, the advantages of digital formats are obvious. But it is not that simple when it comes to the question of raising IS awareness, firstly because the issues involved are mostly very abstract and seem complex to many people. Secondly, there are a range of different types of learners, and this must be taken into account in developing awareness campaigns. People are an analog presence in a digital world. Bits and bytes cannot be seen or touched, and the attacks and attackers' tricks remain incomprehensible. However, the awareness and knowledge that staff possess make them important in preventing security breaches. Several studies have shown that approaches to IS awareness raising that only focus on *knowledge transfer* without *interactive* elements are unable to verify if the information is actually processed and are therefore not sufficient to create lasting awareness—see, for example, SanNicolas-Rocca, Schooley & Spears (2014) and DSV-Gruppe et al. (2006).

Nowadays, online events have gained in importance not least because of the COVID-19 measures (Page, 2020), which have massively accelerated the digital process in trainings. However, in many organizations, information security awareness training (ISAT) is limited to knowledge transfer in terms of providing information (e.g., as presentations or posters) or offering web-based training (WBT) that can be voluntarily completed by the employees at a time and place of their choice (SanNicolas-Rocca, Schooley & Spears, 2014). In practice, various measures might often have been combined to create an awareness program (Abawajy, 2014:240). For example, a mix of print products such as posters and brochures, e-learning, videos, handouts, workshops, and learning scenarios can be used depending on the situation (known_sense, Lanxess & Technical University of Applied Science Wildau, 2015:63). Thus, based on empirical findings, ISAT must supplement knowledge transfer with marketing-oriented promotional elements that focus people's attention (Pokoyski, 2009). Moreover, good story telling can be used to involve participants and encourage them to engage with IS issues (EnBW et al., 2008). In a workshop, smaller groups work together intensively on a topic within a specified time (BMI & BVA, 2018:252). By contrast, the webinar is a seminar or lecture offered over the Internet that classically consists of a presentation (Verma & Singh, 2010:132). In principle, the webinar offers two-way communication, but, from our own experience, this is often limited to the chat function on the part of participants.

Psychology-based research shows, in general, that in addition to the theoretical approach to knowledge transfer and the marketing-oriented approach, a systematic emotionally based approach to communication in the form of *team-based* applications is needed to achieve lasting IS awareness that generates a clear set of intentions and results in appropriate behavior (Khan et al., 2011; Pokoyski, 2009). In order to be motivating, ISAT must also be fun for the people involved—see the project experiences of the Institute of Play (2015). This is why modern ISAT often focuses on communication and experiential face-to-face workshops as one of the best-known pedagogic formats.

In order to foster the necessary atmosphere in the face-to-face workshops, game-based learning (GBL) elements are increasingly included. In GBL, games are designed to support the learning process by challenging learners to achieve learning objectives (Romero et al., 2012:5), while at the same time motivating them to learn by means

of an entertaining design (Dewantara et al., 2020:2). Together with the experiential learning approach, participants will have contact with the environment and engagement with the processes involved, learning that takes place at affective, behavioral, and cognitive levels, a degree of structure, and an active feedback process (Gentry, 1990:20). Le, Weber & Ebner (2013) list the following as important features of serious games:

- active learning (through the continuous play cycle)
- constructive learning (testing alternative courses of action according to the trial-and-error principle and individually interpreting the experience gained)
- self-directed learning (through individual approaches and freely selected playing time)
- social learning (in multiplayer variants through cooperation, competition, and the exchange of experience)
- emotional learning (through profound participation in the action with personal identification—parasocial interaction—and the experience of self-efficacy)
- situated learning (deploying different roles and game settings that correspond to the problems and tasks at hand).

2.2 Positive and negative aspects of face-to-face workshops

Analog educational measures are still preferred (Holmes & Gardner, 2006) and thus face-to-face workshops are an indispensable training measure. The reasons for this and their advantages over the digital format are primarily to be found in the opportunities for greater involvement. Social contact and direct exchange, including body language and signaling, can be easily understood. Social interaction has a positive effect on the performance and receptiveness of the participants (Hurst, Wallace & Nixon, 2013:390). In an analog implementation, the participants are in an appropriate environment for the workshop. This can take place on-site or in an external venue. The advantage here is the opportunity for *informal* exchange and the resulting sense of community, which is promoted by the free time often spent together during breaks or in the evenings (Gratton & Erickson, 2007). An analog implementation also has the advantage of not necessarily being dependent on technology. Even if this usually plays a supporting role in the transfer of knowledge, there may be situations in which it can be disruptive or overwhelming (Alhumaid, 2019:13). Intuitive communication between participants means that they can follow the course of an offline workshop better (Rachmah, 2020:23). It is easier for presenters to address participants directly through eye contact, and the person speaking or being addressed can be clearly determined, which is not the case with workshops held online (Regenbrecht et al., 2014). At the same time, active participation is promoted, because if a participant is mentally absent, it is more likely to be noticed in a group on-site and the interaction is strongly influenced by all those present (Kerres, 2020:3). In addition, a face-to-face workshop can target a broad range of perceptual modes: haptic, visual, and auditory. The instructor can actively influence the workshop and affect its course by intervening, activating, and in extreme cases even reorganizing the workshop.

The most serious negative aspect is the impossibility of holding analog workshops in the face of contact-restricting measures such as lockdowns and social distancing during the COVID-19 pandemic. Offline workshops require a great deal of organizational effort for meetings outside the workplace. In addition, staging external events is expensive, with potentially high costs involved in catering, room rental, accommodation, and providing for special needs—e.g., in the case of people with disabilities. In addition to the positive aspects of a meeting, the stress factor of having to travel and enter unfamiliar surroundings should not be underestimated. Moreover, and regardless of the individual implementation, the format of a face-to-face workshop can be perceived as very conservative, as this is frequently used as a classic continuing education concept (Aldawood & Skinner, 2019:7). However, this view is likely to be invalidated by an interesting, engaging, and interactive mix of methods used professionally in an entertaining face-to-face workshop.

2.3 Positive and negative aspects of digital workshops

In contrast to a face-to-face format, the digital workshop is more flexible in terms of location and less strenuous for participants (Bidmon et al., 2020), eliminating travel and unnecessary overnight stays, which significantly reduces time, costs, and organization. A flexible location helps promote a good work-life balance (Sangarandeniya & Ranasinghe, 2020:101), since participants are operating in familiar surroundings and are spared any additional effort. It also follows the trend toward environmental sustainability by eliminating air and road travel and potentially reducing office space (Hoerning, 2019:2). On the other hand, the ability to

concentrate is impaired by more immediate distractions such as smartphones (Ward 2017:141), noises, and incoming emails and news—casually answering emails also increases the risk, for example, of misjudging phishing emails. Noise during transmission and the heterogeneous audio settings of different speakers lead to variable acoustic quality. Haptic perception is completely excluded from online events, which makes the use of handouts and materials only possible if they are sent to the participants in advance. Various technical problems, such as the fluctuating quality of the Internet connection, can complicate the running of an online workshop. In addition to the purely technical requirements, an online workshop requires a certain level of media competence (Mohammadyari & Singh, 2015:13) and open-mindedness among participants (Wanwipa, 2013:69). Since this cannot always be assumed, a technical introduction to the tool used is sometimes necessary. The selection of the conference tool for live broadcasting has an influence on the success of the workshop. The tools available on the market must not only be selected with regard to their usability but must also comply with the legal requirements of the data protection law. Many tools show their weaknesses here, as BlnBDI (2020) and Strauß (2020) point out. A knowledge of this, together with the problem of permanent self-attention associated with the focus on one's own image (Kerres, 2020:2-3), can influence the attitude and willingness of participants to share their video or sound online. In general, online events bridge distances but ultimately create interpersonal distance. Compared to analog formats, there is less interaction, which requires methods to be adapted accordingly. Finally, unlike in analog sessions, communication can take place unnoticed by the moderator in side-chats. A further indirect effect of online events is that they can weaken the local economy by eliminating overnight stays and the need for other services.

3. Conception of the two online IS workshops on the topic SE and RM

The intention of our two workshops was to test the experiential learning scenarios for IS topics SE and RM, and to obtain the necessary feedback for their finalization. Because of the Covid-19 pandemic, both workshops were planned as *hybrid* processes. "Hybrid" in this case means that the workshop facilitators are on-site with the respective learning scenario set up (see figure 1), but the participants all log in via a video-conferencing system. In fact, the online workshop on RM had to be conducted completely online due to the tightening of COVID-19 measures and associated planning uncertainties. In both workshops, the goal was to test the prototypes of the learning scenarios and to actively and emotionally involve the participants. In the run-up to the workshops, limited on-site tests could already be carried out with trainees and students. The digital testing of analog learning scenarios, on the other hand, is a challenge and should combine the elements of interactivity, tangibility, and exchange of experience.

Figure 1: Our technical preparations for a "hybrid" workshop

To ensure active participation in each workshop, the number of participants was limited to ten. The prerequisites for a successful workshop are good technical equipment and interference-free transmission. As in a face-to-face workshop, attention should be paid to a balance between active phases and breaks. Both workshops were scheduled for two hours plus a thirty-minute buffer, with a quarter-hour break in each case after the first forty-five-minute segment. In the following, the two learning scenarios SE and RM are specified together with the respective workshop concepts. For the development of learning scenarios, first of all a brainstorming takes place on possible thematic focuses and game mechanics. The ideas are then organized using mind mapping. It is helpful to conduct both methods in a group and individually, as this can increase the quantity and quality of the results (Mandal, 2020:336).

3.1 Workshop on the SE learning scenario: "Social Engineering Theater (SET)"

The goal in designing and developing the experience-oriented learning scenario on the topic of social engineering was to look at it from different perspectives. For this purpose, the learning scenario was divided into three parts, which cover the central aspects of social engineering and convey them in a manner similar to circuit trainings already tested in earlier projects. The original idea of a role-playing game developed into a metaphor that connects the parts and takes up concepts from the world of theater and film. The SE learning scenario is therefore called *Social Engineering Theater* or SET, for short.

In addition to the three parts "Sketch," "Direction," and "Backstage," there are the "Prologue" and "Epilogue" which frame them. The "Prologue" introduces the learning scenario and gets the participants in the mood for the game, which then follows in the form of an introductory round. An exclusively digital version was not considered for the online format because this would completely lose the analog character and create a new game. Since the participants cannot act digitally themselves, an avatar was used. The moderators are guided as avatars by the participants and carry out their instructions—e.g., labeling cards and placing them in certain positions. After the prologue, the first act, "Sketch," begins. This is conceived as a role play, which is introduced with a short performance by the participants on the basis of a script and is continued afterwards with a discussion round. At the core of the discussion are card assignments that are intended to promote the conversation. The cards have to be assigned to the four categories "social engineering technique," "attack vectors," "protection or countermeasures," and "communication channels." The second act, "Direction," is a digital video quiz in which participants influence the course of the story with their decisions. Since the digital supplement can be tested separately with less effort, "Direction" was not part of our digital workshop. In the third act, "Backstage," participants, who in reality often find themselves in the role of the defender or victim, switch to the role of the attacker. The change of perspective allows them to understand the approach of social engineers. Based on a newspaper report, they have to reconstruct the steps taken by the attackers based on the scheme of a sequential diagram. The analog learning scenario SET can be set up on a whiteboard, pin board, or table. For the SET online workshop, high-resolution webcams and camera tripods are required. When setting up on a table, a tripod with a swivel arm and counterweights is recommended. To compensate for any deficiencies in the camera systems, the materials should be designed to be as large as possible. For the online breakout sessions, three rooms should be prepared on-site with good audio quality and minimal noise interference. The SET online workshop is designed in three parts: in the first part, "Prologue," as the participants introduce themselves, one of the moderators notes down the information on the gearwheel icons and places it in front of the camera. In the second part, "Sketch," one or two sketches are performed by the presenters instead of the participants. The group is then divided up between three breakout rooms—each with a moderator—in which the sketches are discussed and debated. The results are then presented. The third part, "Backstage," follows a similar principle.

3.2 Workshop on the SRM learning scenario: "Security Risk Roulette (SRR)"

While the analog learning scenario SET is aimed at all employees of an SME, the security RM focuses on middle management as its target group. Accordingly, this analog learning scenario is intended to make the managers of SMEs more aware of the fundamental importance of RM, as well as its specific risks and potential threats. Again, the learning scenario is primarily intended to promote discussion and the exchange of experience among participants. It is divided into five phases and its basic idea draws on the classic game of roulette. The SRM learning scenario is therefore called *Security Risk Roulette*, or SRR for short. The SRR learning scenario begins with an introduction of the participants and their experience with SRM as well as a brief explanation of the rules and the material. In Phase I, the corporate cards are drawn and introduced. The spinning of the roulette wheel determines the contents of the pack from which the risk cards are to be drawn. This is followed by risk assessment and risk evaluation or classification in Phase II, carried out with the help of a 4 × 4 risk matrix based on the frequency of occurrence and the potential damage as per Standard 200-3 of the Federal Office for Security in Information Technology in Germany (BSI, 2017). Then, in Phase III, the participants decide whether to accept the risk that has been identified. If a risk is not accepted, appropriate countermeasures are selected in Phase IV using the previously acquired protection maps. Finally, Phase V involves another spin of the roulette wheel to decide whether and with what intensity a risk will materialize. Then the whole round—phases I to V—is repeated until the set time has expired. On average, eight rounds are planned to provide sufficient exposure to the topic. The increased complexity of the analog learning scenario SRR requires a different approach in the design. For this purpose, stills were created (see figure 2) that are used to visualize the game mechanics step by step in a

presentation. The open rule paths explained there are allocated to three breakout sessions and discussed in small groups before the results are presented in plenum afterwards.

Figure 2: Example of a still for Phase II of the SRR online workshop (in German). In this phase, the company teams define the risk factor for their specific situation. If the opposing team disagrees with a risk classification, one of two protest cards can be used to provide a different answer

3.3 Technical introduction

The online conferencing tools Zoom, Jitsi, BigBlueButton, and Cisco WebEx were examined in detail for functionality and suitability with regard to data protection aspects. In the end, Cisco WebEx, which runs on the university's servers, was selected as it minimizes effort and reduces data collection. One day before the start of each workshop, all the participants were invited to a technical introduction to WebEx (see figure 3). This was to prevent or at least reduce difficulties and uncertainties in using the tool on the actual workshop days. In this course, the functions necessary for the workshop were tested. This included muting, turning the video signal on and off, using the chat, answering polls, entering and leaving a breakout session, using the collaboration tool Etherpad, and editing images together.

Figure 3: Our technical introduction (left) and audio preparations (right) for an online workshop via Cisco tool "WebEx"

3.4 Evaluation of methods

The methods chosen to evaluate the online workshops were an open feedback session and an online questionnaire at the end of the workshop. The online questionnaire consisted of ten questions divided into introduction, technical and general information, digital/hybrid workshop, and analog learning scenario. The questionnaire did not involve the collection of any personal data. The question types were mainly closed questions with either single-choice or matrix options. The two open questions included a text field in which participants could enter their answers. At the beginning of the survey, participants were asked to indicate the particular workshop they had attended. This was the only compulsory question in the survey and served as a control question. In the technical and general part, participants were asked about the type of equipment used, headset, quality, technical problems, and the optimal duration of a workshop. In the online workshop part, the participants provided feedback on the implementation and concrete requests for changes. Finally, in the learning

scenario section, the participants were asked to evaluate the extent to which the online workshop was able to adequately convey the principle and mechanics of the game and what specific changes they would like to see in the learning scenario.

4. Results and summary

The two online workshops were conducted as planned and without any major technical problems. Of a total of twenty participants, twelve took part in and completed the online survey, with seven doing the same for Risk Roulette and five for Social Engineering Theater. Seventy-five percent of participants used a laptop and 25 percent used a desktop PC to take part in the online workshops. A headset was used by over 80 percent. In terms of quality issues, ratings ranged from "very good" to "neutral." The quality of the acoustics was rated as "good" (58%) to "very good" (42%). Almost 60 percent rated the technical introduction to the tool they used as "very good," and one-third as "good." For half, the added inclusion of the Etherpad collaboration tool, which runs on the university's server, was "very good" and for one-third, "good." The fact that other participants sometimes did not mute themselves made it difficult for one person to participate because of noise. Otherwise, there were no technical problems on the part of the participants. For just under 45 percent of participants, a digital workshop should have a minimum duration of either 30–60 or 60–90 minutes. For two-thirds of participants, an online workshop should last no longer than three hours. Despite the good to very good feedback from participants, some responded that they prefer face-to-face events.

4.1 Specific evaluation results for online workshop SET

All the participants who also took the survey felt included in the workshop. The fact that the break time was seen as insufficient in one case could have been due to technical problems on the part of a moderator. Accordingly, the wish was expressed to establish fixed break times. From the point of view of the participants, the content was well to very well timed, the goal was communicated in a comprehensible manner, and the tasks were easy to understand and follow. The quality of the content shared was rated as "good" (60%) to "very good" (40%). The workshop was also perceived as varied. Almost everyone took away important information for their everyday work. For four of the five participants, the workshop was able to convey the principle and the game mechanics of the analog learning scenario "well," and for one person, "very well." Requests for changes to the learning scenario were expressed in advance in the open feedback round. These included, for example, the wish for a prior explanation of the terms "attack vector" and "social engineering technique." One suggestion that would actually change the course of events somewhat is the proposal to initiate a discussion in the "Epilogue," using the protection cards available in the "Sketch," on how an effective defense could be designed in the third act.

4.2 Specific evaluation results for online workshop SRR

The quality of the content shared was rated as mostly "very good" (71%) and occasionally "good" and "neutral" (14% each). The majority of participants (85%) "partially" or "fully" agreed with the statements that the content was optimally timed and the break was sufficient. Almost all participants (85%) felt "well" engaged in the workshop. The workshop was perceived by everyone as "varied." Almost 30 percent of the participants took a "neutral" position on the comprehensibility of the tasks, and 14 percent on the clear communication of objectives. This suggests a slight but important need for improvement on these points and indicates the complexity of the learning scenario. Only some of the participants would take information from the workshop with them into their work. This could indicate that risk assessment is not yet an expected part of everyday work tasks. For the workshop, the wish was expressed several times that the game be played concretely. For four of the seven participants, the workshop was able to convey the principle and the game mechanics of the analog learning scenario "well," for two people, "very well," and for one person, only "moderately." Concrete requests for changes to the learning scenario included blank cards for personalization and the retention of the different game variants.

5. Conclusion and outlook

Learning scenarios, whether analog or digital, need to be tested several times with diverse target groups before an acceptable final version can be created. Under pandemic conditions, this testing of the two analog IS learning scenarios developed for SE and RM became a challenge for the research team. The analog workshops that were originally planned had to be changed. However, previous research on corporate IS has shown that, in addition to knowledge transfer, the participants must also be emotionally involved and interact in order to achieve

sustained awareness. The main question was how this can be done successfully in a digital variant. One of the online workshops for testing analog learning scenarios took place as a hybrid variant and combined face-to-face and digital elements in an individualized way. The other workshop had to be set up on an entirely digital basis. In addition, duration time and breaks must be clearly communicated and adhered to, especially when using several breakout rooms in parallel. Despite all the limitations that online formats entail, the feedback from participants was consistently positive. The successful implementation of the two workshops shows the concrete possibility that the interactive game mechanics of analog learning scenarios can be conveyed and tested digitally. However, this resulted in additional work that was not factored in by the team as part of the project. Moreover, the limitations of the study itself, which included only a few participants, must be taken into account in the evaluation results. Further research and experimentation are needed in this area and will be undertaken in future projects.

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What do Early-Stage Investors Value More in Decision-Making? Horse vs Jockey Debate: A Meta-Analytic Review

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Abstract: There is a long-standing scientific debate on whether opportunity is more important than the entrepreneur or vice versa (horse vs jockey). These are the decision-making criteria used by early-stage investors (business angels and venture capitalists) when assessing whether to invest in a new venture. The two are catch-all terms for many additional criteria such as experience, capabilities, and skills – in relation to the entrepreneur; and market, finance, and product – in relation to opportunity. Almost two dozen (k =20) empirical studies have painted a mixed picture as to which of the two sets of criteria is more important. We performed a meta-analytic review of this issue using the single point estimate method with moderators such as decision-making phase, industry, investor type, and regional characteristics. The analysis was conducted on twenty-two samples from twenty empirical studies involving 1,324 respondents and reported mean and standard deviation values, converted into percent of maximum possible scores (POMP). We found that entrepreneur was considered more important 64.83; CI [54.41; 75.24] than the opportunity M = 57.73; CI [46.71; 68.76], with small but significant differences. The moderators had a strong influence and, given the relatively small number of studies, there was high variance in the results. Our findings show that future research should concentrate on a moderator-based approach to ascertain the circumstances under which the entrepreneur is more important than opportunity in the assessment process.

Keywords: decision-making criteria, entrepreneur, opportunity, business angel, venture capitalist, meta-analysis

1. Introduction

External investment in a new venture comes with a high level of uncertainty and risk and many investments do not meet the expectations of entrepreneurs and their investors and some fail completely (Åstebro and Elhedhli, 2003; Zacharakis, Meyer, 1998; Cassar, 2014). Failures not only cost hundreds of millions USD worldwide but also restrict the release of new products/services and slow technological progress in countries. The reasons for failure can be organized into two relatively independent large groups of risks. First there are the market risks, which are risks affecting products, customers, and are related with competitors, and the economic environment. The second group of risks relates to the entrepreneur and is labelled agency risks (Fiet, 1995a; 1995b). In an effort to avoid or mitigate these risks, investors apply decision criteria targeting them (Riquelme, Watson, 2002; Zutshi, et al. 1999; Mason and Stark, 2004, Ferrati and Muffatto, 2019; Granz, Henn and Lutz, 2020). Based on these risks we can allocate the decision criteria into two groups mirroring the two largest groups of risks: entrepreneur decision criteria targeting agency risks and opportunity decision criteria targeting market risks (Argerich, Hormiga and Valls-Pasola, 2013; Mitteness, Baucus and Sudek, 2012). These are catch-all terms for any additional criteria such as experience, capabilities, psychological, social characteristics, skills, and many more relating to the entrepreneur and market, finance, and product, and the same applies to opportunity (Ferrati and Muffatto, 2019). In business practices as well as in academic papers, there has long been a debate on which of these two large groups of risks and the related decision criteria are more important for early-stage investor BAs or VCs assessing new ventures (MacMillan, et. al. 1985). The high level of failed investments or investments that fall short of expectations is the direct result of underestimating or wrongly assessing the risks, which in practice means placing the wrong weight on the decision criteria relating to the opportunity or entrepreneur. But we do not know which criteria investors consider more important. Do investors placing more weight on the criteria relating to the entrepreneur or on the opportunity when making decisions? This debate has been discussed so frequently and has persisted for so long that it has its own metaphor: horse equals opportunity vs jockey equals entrepreneur (Mitteness, Baucus and Sudek, 2012; Harrison, and Mason, 2017; Kaplan, Sensoy and Strömberg, 2009). In business practices, the discussion is often based on the following arguments. Weak management (entrepreneurs and their teams) means that good opportunities cannot be fully exploited, whereas great management teams are able to redesign weak opportunities or create/find new ones (Gladstone, Gladstone, 2002, Kaplan, Sensoy and Strömberg, 2009, Dhochak, Sharma, 2016). Therefore, it seems that in business practices entrepreneurs are valued little more than the opportunity and this trend can be identified from early studies in the field (MacMillan, et. al. 1985, Muzyka, et al., 1996) . The scientific debate is built on several theoretical approaches. A great deal of the past research based on human capital theory (Becker, 1964) and

upper echelons theory (Hambrick, Mason, 1984) has demonstrated that organization survival, growth, and performance are influenced by entrepreneurs or by the manager of the organization (Unger et al., 2011). In this line of argument, there is both theoretical and empirical evidence favouring the entrepreneur over opportunity, but neither the theoretical argumentation nor the empirical evidence fall unanimously on the side of entrepreneur (Fiet, 1995b). One robust theory – the theory of the firm – posits that alienable assets (when already developed and possessed), such as patents, intellectual property, and physical assets, play a more important role than management does (Hart and Moore, 1994), and replace it at a later stage in firm development (Hellmann, Puri, 2002), which is in direct contrast to theories where the entrepreneur is the central point. These theoretical perspectives have been supported by the empirical findings of Kaplan, Sensoy and Strömberg (2009), who found that companies performed well in terms of revenues, EBIT, market capitalization, and growth, even when the founding entrepreneur was replaced by new management, thus diminishing the importance of the founding entrepreneur (Van Osnabrugge, 2000). Empirical findings on the importance of the criteria relating to the entrepreneur's characteristics and the opportunity used by investors paint a mixed picture. There are studies showing that investors attribute greater importance to the mean value of the decision criteria weights relating to the entrepreneur (for example Mitteness, Baucus and Sudek, 2012; Hoyos-Iruarrizaga et al., 2017). These represent the majority of the empirical studies, but there is a small minority of studies in which opportunity is valued more (Carter and Van Auken, 1994; Van Deventer and Mlambo 2009). The empirical evidence, theoretical argumentation, and business practices seem to show stronger support for entrepreneurs and their characteristics. Therefore, we can expect that entrepreneurs will be valued more than the opportunity (hypothesis H1).

These differences in weights could also be affected by moderators. In the literature, we can identify several moderators that may influence the importance of decision criteria relating to the entrepreneur and to opportunity. The first moderator with a proven effect in some empirical studies is type of investor. Early-stage investors are business angels and venture capitalists. The first investors on the scene are the business angels, who usually deal with products/services still at the development stage, hence they are an unproven market concept and success is heavily dependent on the entrepreneur and managerial team. Moreover, there is no information on company processes, performance, and therefore financial information, which prevents proper due diligence being conducted. The entrepreneur is all that is available so business angels place more weight on criteria relating to the entrepreneur. (Harrison, Mason, 2017, Fiet, 1995b, Fiet, 1995b). This difference in the point at which investment occurs carries through into the decision criteria (Block, et al., 2019; Riquelme, Rickards, 1992; Petty and Gruber, 2011, Van Osnabrugge, 2000). Kaplan et al. (2009) suggest the importance of human capital begins to decline as the company evolves to the extent that alienable assets become more important, which is another argument for venture capitalists valuing opportunity over entrepreneur. Therefore, we expect business angels will consider the entrepreneur to be more important than the opportunity (hypothesis H2a), but at the same time, we think that venture capitalists value the opportunity over the entrepreneur (H2b). The second moderator is regional influence. The individualistic culture in both the USA and Europe, along with the focus on career success, will favour the entrepreneur over the opportunity. Therefore, we expect that the entrepreneur will be considered more important (hypothesis H3). The fourth moderator is the effect of industry. Ventures that emerge and operate in the technological industries rely on qualified human capital, which is a key asset they own. Entrepreneurs in the technology industry tend to be technologically qualified and are the pillars on which future success stands or falls. We expect that in the technological industries entrepreneurs are valued more than the opportunity (hypothesis H4). The last moderator, based on evidence from empirical studies, is the decision phase. Several empirical studies have identified significant differences in the weighting of specific criteria in different phases of the decision process, therefore some scientists consider decision phase a key factor in the horse vs jockey debate (Mitteness, Baucus and Sudek, 2012). Investor decision making is a sequential process and some of the information is not taken into account in specific phases, and indeed some of it is not available in that phase (Maxwell, et al 2011). The empirical evidence paints a mixed picture, but in general, in the screening process, opportunity is valued more than the entrepreneur and in the subsequent decision phases the entrepreneur becomes more important, especially in the presentation phase. (Riquelme, Rickards, 1992; Pintado et al. 2007; Carter and Van Auken 1994; Eisele, Haecker and Oesterle, 2004; Nunes et al. 2014). The effect of the decision stage is discussed as the reason for the entrepreneur versus opportunity difference (Mitteness, Baucus and Sudek, 2012) particularly in light of the sequential and segmented nature of the investor decision processes (Petty and Gruber, 2011). Therefore, we expect that in the screening phase opportunity will be considered more important than the entrepreneur (H5a). At the same time, we think that opportunity is valued more than the entrepreneur in terms of the general criteria applied to the decision

process as a whole (H5b). We expect that the entrepreneur will be valued more in the last step than in the presentation phase (H5c) (Harrison, Mason, 2017).

The fact that all these theoretical, empirical, practical arguments and findings support both sides of the debate is what makes it so persistent. The only solution or scientific method that can definitively tell us what early investors value more – the entrepreneur or the opportunity – is a meta-analysis (Hunter and Schmidt, 2004). Therefore, the aim of this study is as follows: To meta-analytically compare the mean values of the decision criteria relating to the entrepreneur with the mean values of the decision criteria relating to opportunity and to investigate the effect of the moderators (investor type, region, industry type, and decision phase).

2. Methodology

For this meta-analysis, we searched for empirical papers reporting mean values of specific decision criteria, using several steps. Firstly, a search was conducted in the relevant databases – EBSCO, Science Direct, and Web of Science. We searched for these keywords: "business angels", "angel investors", "venture capitalists", "informal investor", and we combined these with the following keywords: "investment decision criteria", "decision criteria", "investment decision making", and "investment decision process". The second step was a manual search of the relevant articles found so as identify other studies described in the articles. Using these techniques, we accumulated 101 studies, of which 20 studies reported numerical mean values with standard deviation.

The empirical studies used a variety of Likert scales (1- 5, 1-7,.01 -1) so we converted them into the same scale metrics using the percentage maximum possible scores (POMP) invented by Cohen et. al (1999). This methodological approach is frequently used in meta-analyses (Johnson et al., 2014, Fischer and Chalmers, 2008). Empirical studies rarely report summary mean scores with standard deviations for the entrepreneur and opportunity. Instead, they report multiple scores for specific characteristics such as the entrepreneur's trustworthiness or market growth potential. Therefore, we organized all the decision criteria into two groups: i. relating to the entrepreneur, ii. relating to the opportunity. Then we calculated the mean of means and pooled variance for both groups. By means of this procedure, we obtained the summary mean score for every study and standard deviation for entrepreneur and for opportunity.

We used a single-point estimate meta-analytical procedure, random effect model to estimate the mean for entrepreneur and for opportunity (Borenstein et al., 2009). When the effect of moderators (investor type, region, industry type, and decision phase) was calculated, only a small number of studies had a high level of heterogeneity. We therefore applied the Sidik-Jonkman method as an estimator of $\tau 2$ (Harrer et al., 2019), which has the most robust results of all the estimator methods for the type of sample we have (Langan et al, 2019). To compare the mean difference, we used a standardized mean difference, which produces more powerful, generalizable, and interpretable results than the mean difference (Takeshima et al, 2014).

3. Results

We found that characteristics relating to the entrepreneur were considered more important by investors M = 64.83; CI [54.41; 75.24] than characteristics relating to opportunity M = 57.73; CI [46.71; 68.76] and this difference was highly significant Z = 4,46; p = 0.00001, and therefore it confirms hypothesis H1.

Table 1: Results of single point estimate method meta-analysis for mean entrepreneur and mean opportunity

Hypotheses	Variable	K	N	Mean (POMP adjusted)	95% CI	τ^2	SE for Tau
	Total effect						
H1	Fixed Entr.	22	1324	61.31	[54.84, 67.77]		
	Random Entr.	22	1324	64.83	[54.41, 75.24]	296.55	111.71
	Fixed Op.	22	1324	47.42	[41.66, 53.17]		
	Random Op.	22	1324	57.73	[46.71, 68.76]	332.62	123.43
H2a,b	Investor type						
	BA Entr.	7	774	69.61	[57.11, 82.12]	37.76	46.76
	BA Op.	7	774	64.69	[50.65, 78.73]	110.22	85.25
	VC Entr.	15	550	62.14	[47.93, 76.36]	430.68	185.64
	VC Op.	15	550	54.78	[39.78, 69.77]	445.73	195.1
H3	Region						

Hypotheses	Variable	K	N	Mean (POMP adjusted)	95% CI	τ^2	SE for Tau
	USA +CAN. Entr.	11	548	58.63	[42.44, 74.82]	422.9	213.15
	USA +CAN. Op.	11	548	53.44	[37.37, 69.52]	416.46	206.63
	Western Europe Entr.	7	662	65.3	[48.97, 81.64]	201.44	138.82
	Western Europe Op.	7	662	51.7	[34.05, 69.43]	196.94	142.25
	Developing ec. Entr.	4	114	82.7	[65.39, 99.96]	5.11	51.41
	Developing ec. Op.	4	114	71.4	[49.05, 93.71]	496.28	401
H4	Target industry						
	Technology based Entr.	6	153	57.74	[34.24, 81.17]	679.05	432.81
	Technology based Op.	6	153	52.74	[25.23, 80.25]	994.9	624.88
	All industries Entr.	15	1171	69.74	[58.38, 81.11]	158.1	92.64
	All industries Op.	15	1171	62.57	[51.12, 74.01]	117.39	84.05
H5a,b,c	Decision phase						
	Screening phase Entr.	9	562	56	[39.13, 72.94]	337.67	193.72
	Screening phase Op.	9	562	46.7	[33.59, 59.73]	375.8	187.17
	All phases Op.	10	430	75.51	[59.49, 91.53]	287.29	188.27
	All phases Entr.	10	430	74.35	[58.01, 90.68]	325.37	194.22
	Presentation phase Op.	3	332	55.1	[40.32, 69.82]	0	0.02
	Presentation phase Entr.	3	332	62.9	[56.72, 69.04]	15.13	16.4

Note. Entr. = entrepreneur, Op. = opportunity, k = number of samples, N = sample size, k = number of studies, N = number of respondents, CI = confidence interval, τ^2 = Tau squared, SE = standard error

According to the theoretical assumptions and some empirical evidence reported in the introduction, our meta-analytical results show that business angels valued the entrepreneur more than the opportunity, thus supporting hypothesis H2a. However, contrary to our expectations we obtained similar results for the venture capitalists, although the standardized mean difference z = 2.85, p = 0.004 is smaller compared to that for the business angels (H2b rejected). In the USA and Canada, and especially in Europe, the entrepreneur is valued significantly more than the opportunity (H3 supported), but in all east Asian countries, plus South Africa is the mean score higher for the entrepreneur. Surprisingly, we found no empirical support for H4, that the entrepreneur's characteristics would be valued more in the technological industries than in mixed industries. Despite the higher mean scores for the entrepreneur in technological industries, it is not significantly higher than opportunity. In mixed industries, the difference is larger. In the screening phase, contrary to our expectation, the entrepreneur was considered more important than opportunity, and this had the strongest effect of all the investigated effects in this study (rejecting hypothesis H5a). Where criteria are reported for all decision phases, this was the first time opportunity was a little more important than entrepreneur, but not significantly so (rejecting hypothesis H5b). In the presentation phase, the entrepreneur was valued more than opportunity (H5c supported). The differences between the entrepreneur's characteristics and opportunity characteristics are larger for some subgroups than for others. We performed a meta-analytical mean groups comparison and report the results in table 2.

Table 2: Comparison of differences (effect sizes) between specific subgroups

Entrepreneur	Opportunity	Z	p
Total effects			
Fixed Entr.	Fixed Op.	12.64	< .00001
Random Entr.	Random Op.	4.46	0.00001
Investor type			
BA Entr.	BA Op.	3.81	0.00014
VC Entr.	VC Op.	2.85	0.00432
Region			
USA +CAN. Entr.	USA +CAN. Op.	2.92	0.0035
Western Europe Entr.	Western Europe Op.	3.12	0.0018
Developing ec. Entr.	Developing ec. Op.	1.4	0.162
Target industry			
Technology based Entr.	Technology based Op.	1.66	0.097
All industries Entr.	All industries Op.	4.4	0.00001
Decision phase			

Entrepreneur	Opportunity	Z	p
Screening phase Entr.	Screening phase Op.	5.86	< .00001
All phases Entr.	All phases Op.	1.24	0.22
Presentation phase Entr.	Presentation phase Op.	3.69	0.00023

Note. Entr. = entrepreneur, Op. = opportunity

4. Discussion

Our meta-analysis identified several unexpected findings that contradict generally accepted and applied knowledge and practices. Firstly, we empirically demonstrated that investors value the entrepreneur's characteristics more than the opportunity characteristics. In relation to the enduring debate about entrepreneur vs opportunity (Mitteness, Baucus and Sudek, 2012; Harrison, and Mason, 2017; Kaplan, Sensoy and Strömberg, 2009), we found that most investors (18 out of 22 independent empirical samples) considered the mean value of the entrepreneur's characteristics more important than the mean value of the opportunity. These results indirectly indicate that early stage investors are more afraid of agency risks than market risks (Harrison, and Mason, 2017, Fiet, 1995a, Fiet 1995b). Our meta-analysis review confirmed a significantly higher preference for the entrepreneur's characteristics than for opportunity, which is in line with human capital theory (Becker, 1964) and upper echelons theory (Hambrick, Mason, 1984). Not only does weighting the entrepreneur's characteristics more than the opportunity have theoretical support but we can also identify meta-analytical results (Unger et al., 2011) that back this, contradicting the findings of Kaplan et al. (2009).

These summary results are supported by partial results. As we can see in table 1, entrepreneurs and their characteristics were valued significantly more in almost every subgroup we investigated. This seems to be a universal result that can be found in every region investigated (not significant in east Asia), in every industry sector, in both the pre-screening and presentation decision phases, and for each investor type (BA and VC). The second unique contribution of this meta-analysis is that almost all the hypothesized and investigated moderators were significant, but the influence of some was the exact opposite of the theoretical expectation. Business angels value the entrepreneur more than the opportunity, which is in line with the theoretical presumptions (Harrison, Mason, 2017); but, contrary to expectation and general practice, so do venture capitalists (Van Osnabrugge, 2000). In the western world (USA, Canada, EU) the entrepreneur is significantly more important than the opportunity, when compared with east Asia where it is still more important, but not significantly so. We could speculate about the influence of social values and norms in Asian countries, which favour more collectivist values over western individualism. Surprisingly, in the technological industries, investors do not value the entrepreneur as much as was expected and the difference between entrepreneur and opportunity was not significant. Several studies have theoretically discussed the importance of decision criteria from a broader perspective in relation to the decision phase (Petty, Gruber, 2011, Cassar, 2014, Brush et al. 2012, Carter and Van Auken 1994). The general consensus is that opportunity is more important in the first screening phase, but the entrepreneur becomes more important in the subsequent decision phases (Brush et al. 2012). Very few studies that have empirically investigated this accepted the hypothesis (Carter and Van Auken, 1994; Eisele et al. 2004; Pintado et al. 2007) and found support for a change in a small fraction of the listed criteria only. Our unique contribution is the finding that the entrepreneur and related characteristics are considered much more important than opportunity in the first screening phase. In our meta-analysis, this was the strongest of all the effects in our study and contradicts the current recommendation and the somewhat ambiguous knowledge in the field. Our final unique contribution is the explicit identification of very high variance (Tau squared) in the studies, which leads to the very high level of heterogeneity in the final meta-analytical results and the wide confidence intervals. These results indicate an absence of consensus between the investors themselves about the criteria they think are important and the weight that should be assigned to them. It is debatable whether investors have enough scientifically validated information about the relationship between decision criteria and future performance, in other words, about the predictive validity of the criteria they apply (MacMillan et al., 1987). Relying on gut feelings, impressions and common sense is standard practice and this has been described and criticized by many authors (Mason and Harrison, 1996; Levie and Gimmon, 2008).

5. Limitations of the study

The results of the mean values generated by the meta-analysis are based on the subjective opinions of early-stage investors and therefore cannot be considered valid, objective, and right, in terms of what is objectively more important: opportunity versus entrepreneur (Riquelme, Watson, 2002). They simply represent investors' assumptions and beliefs. We found that only a handful of the scientific studies attempted to validate the results

reporting investors' weights of the decision criteria (MacMillan et al., 1987, Kaplan, et al. 2009, Zutshi, et al. 1999; Wong, 2009).

Another limitation of this meta-analysis is the limited number of studies used. Despite identifying over 100 empirical studies describing early-stage investors' decision criteria, only 20 studies reported quantitative data that could be used (mean values with standard deviation). The 20 studies were conducted over a span of 30 years so the data aggregation is time restricted because the criteria and evaluation process evolve over time (Silva, 2004).

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Digitalisation as a Determinant of new Payment Methods' Development: The Evidence From Eurozone and Poland

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Abstract: The dynamic development of information and communication technology (ICT) has already impacted the economy, society, culture and politics. As a result, today's economy characterised by hyper-connectivity, data exchange and automation, is defined as a digital economy. The positive impact of digitalisation is already seen in various industries where digital leaders outperform incumbents. Similarly, the development of the banking industry is strictly connected with digitalisation. The remote access to banking services benefits both customers and banks. Digitalisation influences consumer behaviour, including their payment choices. It is thought to be one of the key factors determining the development of new payment instruments and methods. However, there is still a lack of evidence to what extent it impacts a particular payment instrument's usage. Thus the purpose of the paper is to determine the relationship between the level of digitalisation and the usage of different payment instruments, including the new ones. The paper applies the DESI Index to measure digitalisation and the data published by NBP and ECB to analyse the usage of payment instruments in the Eurozone and Poland. The structure of the paper is as follows. The first section introduces the research problem, the hypothesis and the methodology. The second section defines digitalisation, its role in the new payment methods' development and analyses its measures considering their retail payments research application. The third section analyses the relationship between the level of digitalisation and cash and non-cash payments' usage. The fourth examines the relationship between digitalisation and the innovative payment methods' usage in POS and remote transactions. The last part of the paper concludes the research findings.

Keywords: digitalisation, payment instruments, payment innovations

1. Introduction

Todays' economy, frequently referred to as digital economy, is characterised by intensive usage of ICT technology, integration of physical and digital systems, hyper-connectivity forcing interdependence and cooperation, automation of information exchange and data analysis, a development non-predictivity resulting in new opportunities and implementation of new business models. The ICT dynamic development has already impacted the economy, society, culture and politics. The characteristic of the digital economy is determined by a digital transformation (Goliński, 2019). Digitalisation's positive impact is already seen in various industries where digital leaders outperform their peers (Westerman et al., 2012, World Economic Forum, 2016).

Similarly, ICT development and digitalisation are significantly changing the banking industry. Initially, banks' motivation to implement modern technology arose from the desire to improve processes' efficiency. It served to reduce costs (Delafrooz et al., 2013; Persson, 2013) and increase the efficiency, speed, and control of customer-bank interactions (Honebein and Cammarono, 2006). The remote access to banking services benefits both customers and banks. The additional value of the overall customer experience was the possibility to access services whenever and wherever they want (Blount, 2010). During the last few decades, digitalisation visibly influences customer behaviour, including purchase patterns and payment choices. Generally, it is thought to be one of the crucial factors determining the development of new payment solutions in both face-to-face (contactless cards) and remote transactions (e-payment solutions such as on-line and mobile payments), but there is a lack of evidence to what extent it impacts the usage of a particular payment instrument. Thus the purpose of the paper is to determine the relationship between the level of digitalisation in the Eurozone and Poland and the use of particular payment instruments resulting from individual payment choices. The paper hypotheses are as follows:

H1: the increase of digitalisation level causes the decrease of cash payments' share in the structure of the retail payments

H2: the increase of digitalisation level positively impact the level of innovative payment methods' usage

The relation between the level of digitalisation and changes in different payment instruments' usage, including innovative ones, is the new research field. Its multidimensional character causes the necessity to apply different research methods, including inductive and deductive methods and comparative analysis. The theoretical analysis of terms and measures conducted in this paper is based on a literature review including scientific papers, documents and reports on digitalisation, its metrics and payment instruments usage in retail payments. In this part of the paper, the inductive method and comparative analysis were mostly applied.

The empirical part of the paper includes the analysis of quantitative data published by the National Bank of Poland (NBP) and the European Central Bank (ECB). The data analysis was based on statistical methods such as robust correlation coefficients and dispersion measures. Additionally, for the interpretation of results, a comparative analysis was used. The calculations were made using the Statistica.

The structure of the paper is as follows. The first section introduces the research problem, the hypothesis and the methodology. The second section defines digitalisation, its role in the new payment methods' development and analyses its measurement methods, considering their application in the research concerning retail payments. The third section analyses the relation between the level of digitalisation and cash and non-cash payments' usage. The fourth examines the relationship between digitalisation and the innovative payment methods' usage in POS and remote transactions in the European countries. The last part of the paper concludes the research findings.

2. Digitalisation – the concept and measures

In the last few decades, the world's economies have changed significantly. Modern technology development has enabled the shift from the industrial economy to the network economy. The network economy is based on ICT technology, connectivity and human knowledge. The development of the network economy is inextricably linked with the extensive use of digital technologies. Digitalisation, understood as the diffusion of digital technologies leading to a digital economy, transforms consumption and production patterns, business models, preferences and relative prices, and thereby entire economies. The concept of digital economy and digitalisation is constantly evolving. Based on an in-depth literature review Bukht and Heeks (2018) define the digital economy as that part of economic output derived solely or primarily from digital technologies with a business model based on digital goods or services. Generally, digitalisation refers to the use of digital technology in different aspect of everyday life. More precisely, digitalisation is the generic term for the Digital Transformation of society and the economy. It describes the transition from an industrial age characterised by analogue technologies to an era of knowledge and creativity characterised by digital technologies and digital business information. Measuring the digital economy and digitalisation level poses challenges connected with definition/boundaries, data quality problems and digital economy invisibility (Buhkt and Heeks,2018). This results in a multitude of digitalisation metrics which include among others:

- Digital Density Index (DDI) developed by Oxford Economics and Accenture and measuring how digital technologies impact the economic growth (Macchi et al., 2015);
- Digital Economy and Society Index (DESI) introduced by European Commission as a measure to track the evolution of EU member states in digital competitiveness (EC, 2016);
- Digital Society Metrics (DSM) used by OECD focusing on the common usage of ICT across demographic parameters of the population and comprising indicators traditionally used to monitor the information society (Macchi et a;., 2015; Kotarba, 2017);
- Industry Digitalisation Index (IDI) proposed by McKinsey Global Institute (MGI) which covers three groups of metrics: assets, usage and labour for which detailed KPIs are defined (Manyika et al., 2015);
- Digital Enterprise Metrics (DEM) can use IDI or develop it by adding additional measurement areas that are not covered explicitly by the IDI while describing the status and performance of e-commerce and digital customer dialogue in an enterprise.

The DDI aims to guide further investments of both the public and business community to stimulate economic development and is strongly market-oriented, while the DESI includes a view on both economic and social factors, such as human capital potential and usage of ICT by the population. It provides the measurement of society digitalisation and may be mapped with DSM as it incorporates similar dimensions. In turn, the IDI and DEM metrics focus rather on the business perspective. Considering the paper purpose, the DESI index seems to

be the most relevant one as it incorporates both the changes in the economy and the changes in society caused by digitalisation. The DESI index dimensions are presented in Table 1.

Table 1: The characteristics of DESI Index dimensions and metrics (EC, 2021, p. 14)

DESI dimensions	The dimensions' characteristic
Connectivity	The deployment of broadband infrastructure and its quality. Access to fast broadband-enabled services is a necessary condition for competitiveness.
Human Capital	The skills needed to take advantage of the possibilities offered by a digital society. Those skills range from fundamental skills that enable individuals to interact online and consume digital goods and services to advanced skills that will allow using technology as a competitive advantage factor.
Citizen use of Internet Services	The variety of activities performed by citizens already online. Such activities include a broad range of possible internet activity, from online content consumption to everyday communication activities, online shopping, and banking.
Integration of Digital Technology	The digitisation of businesses and development of the online sales channel. Digital technology adoption helps in enhancing business efficiency, reducing costs, and better engaging stakeholders. Additionally, the Internet offers access to broader markets and potential for growth.
Digital public services	The digitisation of public services, focusing on eGovernment It can lead to an efficiency increase for the public administration, citizens, businesses, and better services.

The rapid development of ICT is strictly connected with payment innovations dissemination and new purchase patterns. The rapid growth of e-commerce gives rise to the need to create new payment methods matched with online shopping. Also, in face-to-face transactions, consumers look for payment methods that are convenient, fast, cheap and safe and outperform cash. Innovative payment instruments should improve customer experience. Otherwise, they will not be adopted by consumers. As payment innovations are still evolving, they are difficult to identify and classify. In the literature, there is often assumed that they include e-transfers, contactless cards, mobile payments (contactless and others), online payments, and electronic money (Harasim and Klimontowicz, 2016). The retail payment research usually focuses on the payment methods features, customer habits, and determinants of their development (Klimontowicz, 2019, p. 56-60), mentioning the digitalisation but not referring to its level measures by DESI score. Thus the paper develops the state of the art findings.

3. The relationship between the level of digitalisation and cash and non-cash payments' development in European countries

Logically, the increase in digitalisation level should result in the growth of non-cash payments, especially innovative payments methods and the decrease in cash usage in retail payments (H1). The statistical validation of those relationships poses many challenges due to difficulties with access to robust statistical data reflecting retail payments structure and applying the coherent methodology that enables the cross-country comparison. The methodology used by international institutions as Bank for International Settlements (Red Book Statistics) or European Central Bank (ECB Payment Statistics) includes cash and traditional non-cash payment instruments as cards, credit transfers, direct debits and cheques (BIS, 2017; ECB, 2020). Moreover, the card statistics do not extract the information concerning contactless cards, which are payment innovation used in face-to-face transactions. Both BIS and EBC also collect data on e-money, but its usage is significantly lower in comparison with contactless cards and other payment innovations based on the access to banking accounts (e. g. pay-by-link solutions) as well as solutions offered by other payment service providers (PSPs) used in remote transactions. The only available data for innovative payment methods provided by ECB refers to credit transfers initiated electronically and card payments initiated remotely. As a result, based on BIS and EBC payment statistics, it is impossible to determine the share of particular payment instruments, including innovative ones neither in POS nor in remote transactions.

For these reasons, to verify the H1 hypothesis, the data retrieved from the European Central Bank Study on the payment attitudes of consumers' in the Euro area (SPACE) conducted in 2019 in 17 out of 19 euro area countries (ECB, 2020a) were used. SPACE study was conducted using the payment diary method on the sample of 41,155 respondents reporting their transactions in one-day payment diaries. The payment diaries of 2,061 respondents in Germany and 22,103 respondents in the Netherlands collected in the context of national surveys in 2017 and

2019, respectively, were included in the SPACE analysis where possible. The data enabled estimating the structure of traditional and innovative payment instruments used in face-to-face (POS) and remote transactions. The data for Poland was retrieved from the National Bank of Poland payment statistics and the Harasim and Świecka research conducted in 2019 for the Foundation for Development of Non-cash Transaction (FROB).

Generally, the aggregated DESI index for 2020 was applied as the digitalisation measure because it is calculated based on 2019 data. In the case of remote payments, DESI - The Use of Internet Services Dimension was used as the one that best reflects the level of digitalisation in remote transactions. The assessment was made separately for POS and remote payments (Internet, telephone and mail orders). In the case of POS transactions, cash and card payments, and contactless cards as an new payment method, were taken into account. In the case of remote ones, cash, cards and credit transfer, and e-payment solutions as innovative payment methods were analysed.

Diagnostic tool (Cook's distance) confirmed the presence of outliers and leverage points. In such a situation, Mair and Wilcox (2020) recommend the degree of the linear relation between two variables to be measured by the outlier resistant statistical method, i.e. robust correlation (the Winsorized correlation). The analysis results are presented in Table 2.

Table 2: Robust correlation coefficients (r) for the relation of DESI index 2020 with payment instruments used in POS and remote payments

Type of payment instrument	DESI index (aggregated)		DESI - Use of Internet	
	r	p-value	r	p-value
POS payments				
Cash	-0.468	0.050**	x	x
Cards	0.449	0.062*	x	x
Contactless cards	0.148	0.598	x	x
Remote payments				
Cash	x	x	-0.580	0.015**
Cards	x	x	0.184	0.468
E-payment solutions	x	x	0.111	0.879
Credit transfer	x	x	0.174	0.508

Statistical significance at p-value: * p<0.1, ** p<0.05, *** p<0.01

Source: Own calculations based on European Central Bank (2020), pp. 30, 37 and 90-143 and DESI 2020 country reports.

The cross-country correlation between DESI score and card usage for POS payments toured out to be positive: the countries with high DESI scores were also those with a high share of cards in the total number of POS transactions. The robust correlation coefficient was equal to 0.5 and statistically significant. A negative relationship has been detected between DESI aggregated and cash for POS payments and DESI - the Use of Internet Services Dimension and cash. Both coefficients were close to -0.5 and statistically significant. In this case, the higher value of DESI in general means a lower share of cash.

The results confirmed the H1 hypothesis in part concerning card payments in POS transactions and cash payments in both analysed channels. They showed that the increase in the DESI score is accompanied by decreased cash usage regardless of the transaction type. A positive correlation between the DESI score and cards usage in POS transactions was also found. However, it was not possible to prove a statistically significant correlation between DESI score and contactless cards penetration in POS transactions as well as the DESI - the Use of Internet score and the use of cards, credit transfer and e payments in remote transactions.

4. The relationship between digitalisation and the innovative payment methods' usage in POS and remote transactions

The relationship between the level of DESI index and the use of innovative payment methods in retail payments (H2) was analysed using the dispersion measure for analysed data in relation to the Eurozone mean.

In the case of POS payments, the relationship between the contactless cards penetration and aggregated DESI index was analysed (Figure 1)

* The share of contactless cards in the total number of card payments in POS transactions

Source: Own calculations based on European Central Bank (2020), p. 30 and DESI 2020 country reports, https://ec.europa.eu/digital-single-market/en/countries-performance-digitisation. Data for Poland from Kotkowski, R., Maciejewski, K., Maicki, P. (2020, pp. 33).

Figure 1: DESI 2020 score and contactless cards penetration

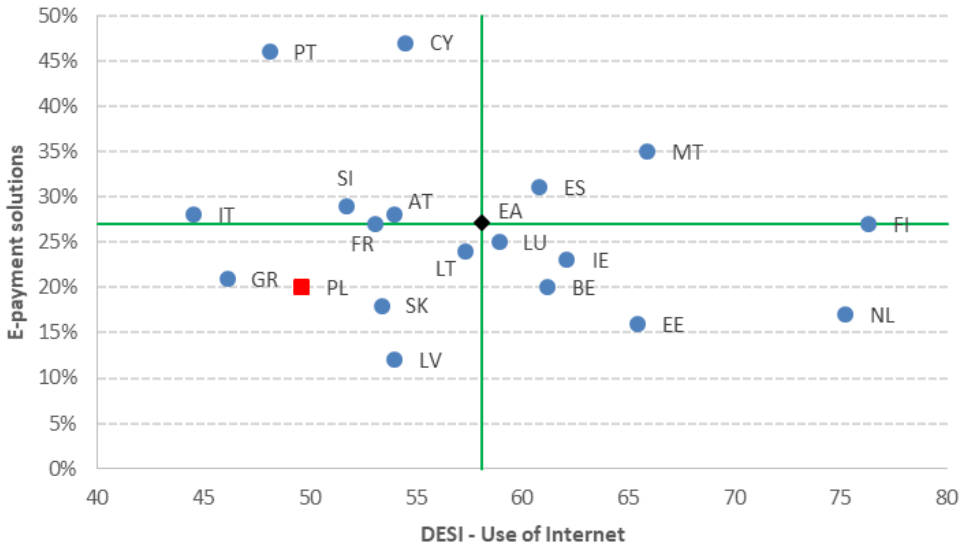
The results are quite surprising. In Eurozone countries with relatively high DESI scores, contactless payments are actively used in Spain, the Netherlands and Finland. In the rest of those countries, the contactless payments' penetration is very low – 35% in Estonia, 16% in Belgium and only 3% in Germany. The highest share of contactless payments in the total number of card payments made at POS was observed for countries with relatively low DESI index scores. The highest level of contactless penetration refers to Poland. Similarly, in such countries as Slovakia, Greece and Slovenia, it is also higher than the Eurozone mean. The only country in this group with a lower level of contactless penetration than the Eurozone mean was Portugal (24%)

It can be assumed that the high level of contactless payments penetration in countries with a low DESI index is due to two factors. On the one hand, contactless cards are highly competitive in relation to cash in face-to-face payments. They are also relatively less innovative than other payment innovations that support their quick adoption. On the other hand, the high level of their penetration may result from more aggressive promotion of these cards in the payment markets with a lower consumer protection level.

Both factors occurred in Poland, one of the countries with the highest level of contactless card usage not only in Europe but also in the world. In Poland, the first contactless cards were issued in 2008. In 2011 their share in the total number of cards issued was 29,4%, and the share of POS terminals accepting contactless payments in the total number of POS terminals was 18% (NBP, 2011, p. 11). Two years later, in 2013, the share of contactless cards was higher than one half of issued cards - 57,7%. Similarly, the share of POS accepting contactless payments reached the level of 52,1% (NBP, 2013, p. 11-12). The latest data shows that in the first half of 2020 86,8% of issued cards are contactless ones, and their share in the number of POS transactions reached 92,9%. Since 2018, all POS terminals accept such payments. The dynamic increase in cards usage, especially the contactless ones, had caused the decrease in the share of cash in retail payments from 80% in 2013 to 57% in 2018 (NBP, 2019, p.41) and 52% in 2019 (Harasim and Świecka, 2019, p. 13). The higher the transaction value, the lower the cash share, but still cash dominates in low-value transactions. However, also in those transactions its share is systematically decreasing. In the analysed period, in the case of transactions below 10 PLN, the share of cash declined from 93% in 2013 to 82% three years later (Maison, 2017, p. 34) and 61% in 2019 (Harasim and Świecka, 2019, p. 30).

More dynamic development of payment innovations can be observed in remote transactions. While in face-to-face transactions cash and card payments are predominant, in remote transactions credit transfers and e-

payment solutions (e.g. PayPal, Sofort, Afterpay), which represent innovative payment methods, are also used. Since the lion's share of remote purchases is online shopping, a different measure of digitalisation was adopted than for POS transactions. Instead of the aggregated DESI index, the DESI - Use of Internet Dimension was applied as its sub-dimensions to better extent fit the activities performed by consumers online, including banking and shopping. Figure 2 presents the relationship between the e-payment solutions' usage and the DESI - Use of Internet Services Dimension index.



Source: Own calculations based on European Central Bank (2020), p. 37 and DESI 2020 country reports, https://ec.europa.eu/digital-single-market/en/countries-performance-digitisation. Data for Poland from Harasim and Świecka (2019, p 16).

Figure 2: DESI 2020 - Use of Internet and e-payment solutions usage

The results showed that in the countries with a relatively low DESI - Use of Internet score (lower than the Eurozone mean) and high contactless cards penetration, the level of e-payment solutions usage was relatively low (lower than the Eurozone mean). Such a correlation was observed for Lithuania, Slovakia, Greece, Latvia and Poland. The most significant usage of e-payment solutions was recorded in countries with a low DESI-Use of Internet score, i.e. Cyprus (47%), where the level of contactless penetration was also significant and in Portugal (46%) having, by contrast, the relatively low level of contactless cards penetration (the lowest among countries with DESI Use of Internet below the Eurozone mean).

In countries with a relatively high level of DESI-Use of Internet, the e-payment solutions usage varied between 16% and 35%, whereas the Eurozone mean was 27%. The results' dispersion in this group was noticeably smaller than in the group of countries with a relatively low DESI-Use of Internet score, where the use of e-payment solutions varied from 12% to 47%. Countries with a relatively high DESI-Use of Internet score also have a lower level of e-payment solutions used in remote transactions (lower than the Eurozone mean). The lowest usage was recorded in Estonia (16%) and the Netherlands (17%). In both countries, it may be explained by the high use of credit transfers[1] in remote transactions. The share of credit transfer usage in remote payments was noticeably high in the Netherlands - 64% (ECB, 2020, p. 36), where the iDEAL[2] payment system integrated with online banking systems is strongly widespread. The higher than Eurozone mean level of using e-payment solutions in remote transactions was only noted in two countries - Malta and Spain.

In Poland, which has one of the lowest DESI -Use of Internet score in Europe (23rd position out of 28), the e-payment solutions usage is relatively low (7 percentage points lower than Eurozone mean). However, it should

[1] Similarly, in Latvia and Finland credit transfers were used more often in online payments than in any other country covered by SPACE Study.
[2] iDEAL is an e-commerce payment system introduced in 2005 based on online banking allowing customers to pay for their online purchases by using direct online transfers (SEPA Credit Transfers) from their bank account in a user-friendly, cost-efficient and secure way. Merchants receive real-time confirmations of the iDEAL payments which are guaranteed and irrevocable. iDEAL remains by far the most popular method for online payments in the Netherlands. Currently iDEAL is offered by 12 issuers (consumer banks) and 11 acquirers as well as 60 payment institutions to end users (consumers and merchants). Most payment institutions cover international reach.

be noticed that in Poland consumers much more often than in other European countries choose cash on delivery option or credit transfer which means pay-by-link solutions (35% and 32% respectively) and much less often they pay by card (12%) shopping online - (Harasim and Świecka,2019, p.16). Until 2017 couriers accepted only cash and did not accept cards, what resulted in the rapid growth of pay-by-link payments becoming the most frequently used e-payment solution in remote transactions. Concurrently, BLIK, which is the common mobile payment standard, has expanded its reach. Established by the six largest banks operating in the Polish banking market, it is open to other banks and payment service providers. Within three years of creation, it took a substantial share of 95% (by transaction value) in mobile payments in Poland (NBP, 2019, p. 62). Today it is offered by fifteen banks, and its owner (the Polish Payment Standard) cooperates with Mastercard to facilitate its foreign expansion. In the middle of 2020, the number of BLIK mobile applications exceeded 12 million. Similarly, the acceptance network was growing and reached 650 000 terminals and over 122 000 e-shops at the same time. BLIK is primarily used in remote transactions. In the middle of 2020, three-quarters of BLIK payments were made online, 8,8% were made at POS, and 9,3% were P2P payments (Kotkowski, Maciejewski and Maicki,2020, p. 39).

SPACE Study shows that the COVID-19 pandemic accelerated the development of non-cash payments, including e-payment solutions and mobile payments and the shift from cash to the use of non-cash payment instruments. The Eurozone citizens more willingly used non-cash payment instruments, especially contactless cards, guided by the convenience and the fear of infection when paying in cash. The most considerable changes in payment habits were observed in Belgium and Spain and the slightest in Estonia, Latvia and Malta. Moreover, as many as 87% of respondents declared that they continue to pay less with cash after the pandemic. 46% of them defined this change in their behaviour as certain and 41% as probable. Only 13% of respondents said they would revert the payment behaviour before the crisis (ECB, 2020, p. 22-24).

5. Conclusion

Digitalisation is commonly thought to be a key factor influencing a shift toward using ITC technology in different fields of everyday life. In the case of retail payments made in the Eurozone and Poland, the results confirmed that in part. In POS transactions and cash payments, the increase in the digitalisation level was accompanied by decreased cash usage regardless of the transaction type. But a statistically significant correlation between the digitalisation level and contactless cards penetration in POS transactions and the use of cards, credit transfer and e payments in remote transactions was not found. What is even more surprising, in Eurozone countries with relatively high DESI scores, contactless payments are actively used only in Spain, the Netherlands and Finland. In the rest of those countries, the contactless payments' penetration is very low. Generally, a broader range of innovative payments solutions is used in remote transactions. Interestingly, the results showed that in the countries with a relatively low DESI - Use of Internet score but high contactless cards penetration, the level of e-payment solutions usage was relatively low. The most significant usage of e-payment solutions was recorded in countries with a low DESI-Use of the Internet. In countries with a relatively high level of DESI-Use of the Internet, the e-payment solutions usage varied, leading to the conclusion that it is influenced not only by digitalisation but also by payment habits.

Despite the relatively low digitalisation level in Poland, non-cash payment instruments, especially the innovative ones, grow faster than in more developed countries. This is particularly true for contactless cards, the most widespread innovative payment instrument in face-to-face transactions. The share of e-payment solutions in remote payments is lower than the Eurozone mean so far, but they are gaining increasing popularity. It led to the conclusion that the level of digitalisation need not be the barrier to new payment methods' development. The fast growth of innovative payment methods in Poland resulted in a decrease in cash usage, however, it still predominates in low-value transactions.

Based on the existing literature and research findings, it can be concluded that there is no universal measure of digitalisation by now. The synthetic character of currently used measures decreases their usefulness for the research conducted in retail payments. The review of existing digitalisation measures highlights the necessity to search for indicators, which can be more adequate and valuable in the payment market research. Additionally, there is a need to extend the catalogue of payment instruments and methods applied in payment statistics (e.g. BIS Red Book and ECB payment statistics) by adding new payment instruments and methods. Moreover, data should be collected using a uniform methodology. Only gathering such data on a commonly shared basis will enable assessing changes in different payment instruments' usage, including the innovative ones.

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An Empirical Investigation of Online Entrepreneurship Education, Application on University Students in Egypt

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Abstract: Due to the coronavirus pandemic, students and educators across all levels of education were forced to shift away from the classroom and rapidly adopt and adapt to online learning. While there was already high growth of online learning before the pandemic, the scale of the current crisis's impact on education is unprecedented. Scholars believe that the impact of this — and the developments required to make it work — could permanently change how education is delivered. As entrepreneurship education covers a wide variety of audiences, objectives, contents, and pedagogical methods, it requires a flexible and informal learning environment, hence some researchers claim that online platforms can be one of the tools to achieve the aims of entrepreneurship education. However, most of research about entrepreneurship education have discussed the traditional classroom offerings, while the online education has been scarcely documented, thus this study aims at answering the following question: Can online education contribute to the development of students' entrepreneurial skills and impact their attitudes toward entrepreneurship, as effectively as classroom teaching? A survey was developed and e-mailed to 300 university students enrolled in an entrepreneurship course at the British University in Egypt. They were divided into two groups, the first is taking the online version of the course and the second is attending a classroom. The statistical analysis focused primarily on examining the differences between the two groups, aiming at informing educators whether they will need to adjust their pedagogical approaches or not to improve the students' learning outcomes and as well universities to put right strategies for their online entrepreneurship education programmes mainly those who have limited financial resources, especially it is still unclear whether the adoption of online learning will continue to persist post-pandemic. The results have shown that online EE has a positive impact on students, however, it remains less than online EE.

Keywords: entrepreneurship, entrepreneurship education, online learning, self-efficacy, entrepreneurial attitudes, coronavirus

1. Introduction

Entrepreneurship has been recognized as an engine for social and economic development; entrepreneurs are change agents who introduce new ideas and organizational practices (Feldman, Ozcan & Reichstein 2020) and their startups are a major source of innovation employing emerging technologies to invent products (Kohler 2016). This has called policy makers, governments, and researchers to consider and deploy different approaches to promote and boost entrepreneurship within their countries. One of which is entrepreneurship education (EE) (Fretschner and Weber 2013; Cheung 2008). Although a consensus has not been reached on whether entrepreneurship can be stimulated through education (Boldureanu, et al 2020), a significant amount of literature acknowledges its role in developing students' entrepreneurial skills, attitudes, intention, and behaviour (Fayolle and Klandt 2006; Pittaway and Cope 2007; Hattab 2014; Barba-Sánchez and Atienza-Sahuquillo 2018), hence preparing them to be more entrepreneurial.

Due to the coronavirus pandemic, students and educators across all levels of education were forced to shift away from the classroom and rapidly adopt and adapt to online learning (Rajab, Gazal and AlKattan 2020) as a subsequent implementation of social distancing. A similar trend is found in Egypt (Moawad and Corkett 2020). The education sector has been one of the sectors that has been most affected by the pandemic (Taha 2020) with approximately twenty million students enrolled in schools and universities across the country. While there was already high growth of online learning before the pandemic (de Jong et al, 2020), the scale of the current crisis's impact on education is unprecedented (Tanveer et al, 2020). Scholars believe that the impact of this — and the developments required to make it work — could permanently change how education is delivered.

As entrepreneurship education covers a wide variety of audiences, objectives, contents, and pedagogical methods, it requires a flexible and informal learning environment. Even without COVID-19 influence, EE needs to catch up with the speedy transition in the business world to deliver effective learning courses to support developing entrepreneurial students with entrepreneurial mindset (Takemoto and Oe 2021). Hence some researchers claim that online platforms can be one of the tools to achieve the aims of entrepreneurship education as the relationship with technology has significant impacts on various aspects of business behaviour.

However, most of research about entrepreneurship education have discussed the traditional classroom offerings, while the online education has been scarcely documented (Audet et al, 2018).

Since providing EE to students without examining its impact on students' intentionality, might not lead to achieving the desired goals (Sahoo and Panda, 2019), coupled with the lack of research on the impact of online EE, this study aims at answering the following question: Can online entrepreneurship education contribute to the development of entrepreneurial students as effectively as classroom teaching?. Therefore, this study explores the direct effect of online entrepreneurship education on Egyptian students' entrepreneurial attitude, self-efficacy, and interest. It also assesses whether the online entrepreneurship education courses are effective enough to foster the individual competencies, willingness, or drive of an individual to choose entrepreneurship as a career option.

The rest of the paper is structured as follows: a literature review section giving an overview of previous research on entrepreneurship education and the migration to online education, followed by the methodology section to clarify the sample and methods of data collection employed; the study results section reporting and discussing the outcomes from the statistical analysis and finally conclusion section providing the implications for theory and practice and the limitations of the research.

2. Literature review

The landscape of employment has been changing (International Labor Organization 2019); it is more evident now that student interest in choosing entrepreneurship as a career option is growing, while the interest in traditional jobs in is gradually declining. Higher Education Institutions' role has been changing to focus on providing an effective support system to their students so that they will become job creators, not job seekers (Tomy and Pardede 2020). It is believed that entrepreneurship education goes along with this line of thought, to equip graduates with desirable skills and an additional career path beyond employment in the public or private sector (Kuckertz 2021).

An earlier definition of Entrepreneurship education (EE) provided by McIntyre and Roche (1999, p. 33), is «the process of providing individuals with the concepts and skills to recognize opportunities that others have overlooked, and to have the insight and self-esteem to act where others have hesitated". However, many scholars believe that entrepreneurship education should be considered as a model of lifelong learning (Linan 2004) not for venture creation only, hence a modified definition was introduced which is a "pedagogical courses, programs and processes offered to students to develop or strengthen their entrepreneurial traits, attitudes and skills" (Hahn et al, 2017, p. 945). The establishment of entrepreneurship education at higher education institutions is a phenomenon that gained traction in the 1990s (McMullen, 2019) and has been a tremendous success on a global scale (Kuckertz 2021).

Researchers have found that entrepreneurship education helps in fostering individual competencies or individual entrepreneurial orientation (Farashah, 2013; Franco et al., 2010; Lindberg et al., 2017; Robinson and Stubberud, 2014), which leads to the development of entrepreneurial intention (Fayolle and Lin˜an, 2014; Ferreira and Trusko, 2018; Hassan et al., 2020; Anwar et al., 2020; Anwar and Saleem, 2018; Shapero and Sokol, 1982), while Bae et al. (2014) and Botha and Bignotti (2016) argued that entrepreneurship education can shape the individual's attitude toward entrepreneurship. Peterman and Kennedy (2003) found that the ability and desire to undertake a venture increased among students after participation in an entrepreneurship program, while Olugbola (2017) argued that every individual has a certain level of opportunity identification and this can be improved through training and education. However, some studies produced different findings, for example, Karimi et al. (2016) and Oosterbeek et al. (2010), found that the differences in the intention to start a venture before and after attending an educational program were not significant.

One of the major issues in entrepreneurship education is how the subject should be taught (Pittaway and Cope, 2007). While there are several traditional and non-traditional methods related to EE, for example, lectures, guest speakers, action-based entrepreneurship programs (Rasmussen and Sørheim, 2006), educators are still struggling to find the appropriate educational objectives and little is known about effective teaching techniques for EE (Brockhaus et al, 2001). The literature is divided on the effectiveness of traditional methods to teach entrepreneurship (Al-Atabi and DeBoer 2014), while the online learning might create an obstacle for the

provision of entrepreneurship education (EE) as it is a discipline, which requires students to acquire "learning by doing" (Chen, Ifenthaler and Yau, 2021).

However, due to the COVID-19 the largest disruption of education systems in human history has been created, impacting billions of learners worldwide. The social distancing, restrictive movement policies and closures of schools and universities (Pokhrel and Chhetri, 2021) have significantly disturbed the traditional educational practices and left no way but to depend on the digital/online learning. Singh and Thurman (2019) defined online learning as the use of the internet in some way to enhance the interaction between teacher and student. While online entrepreneurship education is not novel (Liguori and Winkler, 2020), it has not gained the widespread adoption, mainly because relatively little is known about its impact and effectiveness (McPherson and Bacow, 2015), with even less known within the context of entrepreneurship education.

3. Purpose and research questions

Entrepreneurship education has been acknowledged to have a positive contribution on the development of pupils' know-how, skills, as well as on the enhancement of entrepreneurial attitude and intention. In Egypt, EE has been introduced as a mechanism to create entrepreneurially empowered individuals and combat the unemployment among youth. Due to the impact of COVID-19 pandemic, education process has been conducted using online platforms. However, studies on educational technologies in EE have been limited despite the practical development of online and blended EE courses using the internet and educational tools.

Given the interest and involvement of higher education institutions in creating entrepreneurship curricula and the migration to online education, the purpose of this study was to investigate Egyptian students' attitudes toward entrepreneurship and examine how online EE impacts a variety of entrepreneurial outcomes. The research question addressed is: can online entrepreneurship education contribute to the development of entrepreneurial students as effectively as classroom teaching?

4. Method

To investigate the impact of entrepreneurship education, the researcher utilized an assessment instrument that was developed by Duval-Couetil, Reed-Rhoads and Haghighi in 2010 aimed at examining multiple outcomes of an entrepreneurship programme delivered to engineering students. The original assessment draws on survey items that fall into six categories including: 1) attitudes, 2) behaviours, 3) knowledge and skills, 4) self-efficacy, 5) perceptions of programs and faculty, and 6) demographic data. The instrument has been validated and used by other scholars, for example, Castro and Zermeño 2020; Purzer, Fila and Nataraja 2016, for the same purpose. It has been chosen for the current study because it is a comprehensive tool that incorporated different scales to measure interests, perceptions and knowledge but is user-friendly and not so lengthy that students would hesitate to participate (Duval-Couetil, Shartrand and Reed 2016).

For the current study, the researcher used the following categories with slight modifications: 1) attitudes: items focused on investigating students' interest in entrepreneurship, the attractiveness of entrepreneurship as a career choice and the reasons why they are or are not interested in entrepreneurship; 2) self-efficacy: items focused on investigating students' perception of their ability to perform entrepreneurial tasks; and 3) perceptions of programs and faculty in terms of its usefulness in attracting students to entrepreneurship. The survey items used Likert-type, 5-point, ordinal responses that represented verbal statements. To simplify the analysis and reporting of the data, 5-point response scales were collapsed into three by grouping responses. For example, the responses 'strongly agree and agree' were combined as were 'strongly disagree and disagree (Duval-Couetil, Reed-Rhoads and Haghigh, 2010).

To investigate the effectiveness of online education compared to classroom teaching in developing students' entrepreneurial behaviour and their attitudes toward entrepreneurship, the researcher targeted undergraduate students at Egyptian universities as a population for the current study while the sample constituted students at the undergraduate level who are registered at an entrepreneurship course as part of fulfilling the requirements for their academic year. They were divided into two groups based on the mode of delivery; thus, one group was taught via online medium and the second group via face-to-face medium. The total number of the sample was 300 students divided almost equally between the two groups. The sampling was purposive where subjects (students) were selected based on study purpose with the expectation that each participant will provide unique and rich information of value to the study.

The data was collected from students using web-based self-administered questionnaire at the end of the course. Overall response rate was 67% whereas for the first group it was 65% and the second group, it was 68%. The Cronbach's alpha of the constructs related to attitudes, self-efficacy and perception of programme scales ranged between 0.8-0.92, which is according to rule of thumb is good (George and Mallery, 2003).

5. Results

The current research is an exploratory research aims at investigating the effectiveness of online EE on the entrepreneurial outcome for students at the undergraduate level through contrasting it with offline EE. This section presents the findings of the data analysed using Statistical Package for Social Sciences (SPSS).

- Students' Attitudes about entrepreneurship as a career choice

Students were asked to rate their level of interest in several post-graduation options. Students in both groups were most interested in working for a multinational/large companies (Table 1. The students who received offline EE were more inclined towards entrepreneurial ventures compared to those who received it online; they have higher level of interest in either starting their businesses or working for a start-up, 18.5% and 10,5%, respectively, compared to 13% and 1.5%, respectively.

Table 1: Comparison of interest in post-graduation options

		mode of delivery?	
		Online	offline
% within Consider your after graduation options, I plan to	Attend graduate school	10.0%	90.0%
% within mode of delivery?		1.4%	7.1%
% of Total		.5%	4.5%
% within Consider your after graduation options, I plan to	Start my own business	41.3%	58.7%
% within mode of delivery?		35.6%	29.1%
% of Total		13.0%	18.5%
% within Consider your after graduation options, I plan to	Work for a startup	12.5%	87.5%
% within mode of delivery?		4.1%	16.5%
% of Total		1.5%	10.5%
% within Consider your after graduation options, I plan to	Work for multinational/large company	41.4%	58.6%
% within mode of delivery?		56.2%	45.7%
% of Total		20.5%	29.0%
% within Consider your after graduation options, I plan to	Work for the government	50.0%	50.0%
% within mode of delivery?		2.7%	1.6%
% of Total		1.0%	1.0%

When students were asked about the reasons why they would and would not start their own businesses, each group expressed different reasons (Tables 2 and 3, respectively). For the students who received an offline education, the top three reasons for them to start a business is "I would start a business in order to make more money", "I would start a business in order to create something of my own" and I would start a business in order to focus on a technology/field/hobby that interests me", while the top reasons for those who received an online EE, were "I would start a business in order to have more flexibility and independence", "I would start a business in order to create something of my own", and "I would start a business in order to satisfy a need in a market". It is interesting to note that the least chosen reason for both groups was the same which is "I would start a business in order to follow a family tradition". The result for both groups complies with Hattab's (2014) findings that EE has a positive impact on students' positive perception of entrepreneurship.

Regarding the reasons that would stop them from starting their own businesses, there were slight differences among the two groups. For those who received an offline EE, their top reasons were "Lack of experience in management and finance", "Excessively risky£ and "Lack of legal assistance or counselling", while for those who received an online EE, their top reasons were "Excessively risky", "Lack of initial capital for start-up" and

"Lack of legal assistance or counselling". It is interesting to note that both groups ranked "fear of failure" and "doubts about personal abilities" in a lower position compared to other reasons, indicating the positive impact EE had on them despite the mode of delivery, which complies with the findings of Al-Jubari et al (2019).

Table 2: Reasons why students would start their own business

Item	Online Agree	Rank	offline Agree	Rank
I would start a business because I have an idea for a business product or technology	49%	8	54%	7
I would start a business in order to follow a family tradition	9%	13	11%	13
I would start a business in order to focus on a technology/field/hobby that interests me	64%	6	72%	3
I would start a business in order to create something of my own	74%	2	75%	2
I would start a business in order to have more flexibility and independence	76%	1	69%	4
I would start a business in order to have more free time	28%	12	30%	11
I would start a business in order to solve a social problem	46%	9	51%	8
I would start a business in order to make more money	70%	4	80%	1
I would start a business in order to be the owner/at the top of company	65%	5	48%	9
I would start a business in order to create jobs	63%	7	59%	6
I would start a business in order to satisfy a need in a market	73%	3	66%	5
I would start a business in order to manage people	30%	11	15%	12
I would start a business in order to gain high social status	43%	10	38%	10

Table 3: Reasons why students would not start their own business

Item	Online Agree	Rank	offline Agree	Rank
Lack of ideas regarding what business to start	39%	6	34%	8
Lack of assistance available to assess business viability	43%	5	44%	6
Lack of initial capital for start-up	49%	2	47%	5
Lack of legal assistance or counseling	47%	3	51%	3
Lack of knowledge of the business world and the market	35%	7	48%	4
Lack of experience in management and finance	45%	4	58%	1
Fear of failure	33%	8	39%	7
Doubts about personal abilities	25%	9	24%	9
Having to work too many hours	24%	10	20%	10
Lack of support from people around me (family, friends, etc)	16%	11	19%	11
Excessively risky	50%	1	55%	2

- Students' perception of their entrepreneurship Self-efficacy

Self-efficacy refers to an individual's belief in his/her capability to perform tasks and roles aimed at entrepreneurial outcomes (Newman et al, 2019). Students were asked to rate their ability to start a business

using Five-point scale evaluation (1. very poor; 2. below average; 3. average; 4. above average; 5. excellent). Students who received an online EE showed confidence in their ability to start a business (Table 4), as 44% of them gave above average and excellent rating, but compared to those who received an offline EE, they are less confident. This result complies with the findings of Audet et al (2018) that the students enrolled in the online section are generally less successful in achieving the course's objectives, particularly competencies, skills, and attitudes.

Table 4: Students' perception of their ability to start business

		mode of delivery?	
	Rating	**Online**	**offline**
% within How would you rate your ability to start a business?	poor	56%	44%
% within mode of delivery?		7%	3%
% of Total		2%	2%
% within How would you rate your ability to start a business?	below average	42%	58%
% within mode of delivery?		14%	11%
% of Total		5%	7%
% within How would you rate your ability to start a business?	average	30%	70%
% within mode of delivery?		37%	50%
% of Total		13%	32%
% within How would you rate your ability to start a business?	above avergae	41%	59%
% within mode of delivery?		36%	29%
% of Total		13%	18%
% within How would you rate your ability to start a business?	excellent	36%	64%
% within mode of delivery?		7%	7%
% of Total		2%	4%

Moreover, students were asked to rate their entrepreneurial competencies after attending the course. Competencies refer to the knowledge and skills required to perform a specific job and it is changeable, learnable, and attainable though education (Volery, Mueller & von Siemens, 2015). Students who have received online EE reported an improvement in their entrepreneurial competencies after attending the course, as 48% rated it as above average and excellent (Table 5), while 56% reported an improvement after attending an offline EE. Overall, students who received an offline entrepreneurship education were more successful in developing entrepreneurial competencies after attending the course compared to those who received it online (34% and 17%, respectively).

Table 5 Students' perception of improvement in their entrepreneurial competencies

		mode of delivery?	
	Rating	**Online**	**offline**
% within Overall, how would you rate your entrepreneurial competencies after attending the course?	poor	33%	67%
% within mode of delivery?		3%	3%
% of Total		1%	2%
% within Overall, how would you rate your entrepreneurial competencies after attending the course?	below average	11%	89%
% within mode of delivery?		1%	6%
% of Total		0%	4%
% within Overall, how would you rate your entrepreneurial knowledge after attending the course?	average	43%	57%
% within mode of delivery?		48%	37%
% of Total		17%	23%
% within Overall, how would you rate your entrepreneurial competencies after attending the course?	above average	34%	66%
% within mode of delivery?		36%	40%
% of Total		13%	25%
% within Overall, how would you rate your entrepreneurial competencies after attending the course?	excellent	33%	67%
% within mode of delivery?		12%	14%
% of Total		4%	9%

- Students' perception of their entrepreneurship programme

Students were asked about the degree to which entrepreneurship was being addressed within their courses (Table 6). Students who were receiving an online EE had better perception compared to those who received it offline, 70% of them reported that it was a great opportunity to learn about entrepreneurship and 70% of them as well felt that EE can broaden their career prospects, versus 67% and 67%, respectively, for those who received it offline.

Table 6 Students' perception of their entrepreneurship programme

Item	Online	offline
	Agree	Agree
In general, in my faculty, students are encouraged to consider starting their own companies	34%	38%
In general, in my courses, entrepreneurship is presented as a worthwhile career option	70%	54%
I am not interested in taking entrepreneurship classes	7%	16%
Entrepreneurship education can broaden my career prospects and choices	70%	67%
I am not interested in the subject of entrepreneurship	9%	12%
It was a great opportunity to learn about entrepreneurship in my course(s)	70%	67%

Moreover, 70% of those who received online education perceived entrepreneurship as a worthwhile career choice based on what they have studies during the semester, compared to 54% who received it offline. The researcher employed "reverse wording" to ensure that students were not answering carelessly, and that no biases exist within their answers, hence, two questions asked the students about their interest in the subject of entrepreneurship and taking entrepreneurship courses. However, the results students who received the online entrepreneurship education had higher level of interest in entrepreneurship compared to those who received it offline.

6. Conclusion

Entrepreneurship education has been introduced as one of the mechanisms to boost entrepreneurship, which encouraged researchers to study it closely considering the debate whether entrepreneurs are born or made and hence whether entrepreneurship can be taught or not. While this debate was yet to be resolved, another debate arose which is, is online entrepreneurship education effective as the offline? This exploratory research was conducted to answer the question and hence provide further insights about the online entrepreneurship education.

The results of this study show that students had positive view on entrepreneurship education, they believed that it broadens their career prospects and choice, improves their entrepreneurial competencies, and leverage their abilities to start a business. However, the majority do not expect to pursue entrepreneurial careers, rather they reported that they were most interested in working for a multinational/large size organization after graduation. Considering the mode of delivery, students who received an online entrepreneurship education were less inclined towards starting their own businesses or work for a start-up than those who received it offline. They reported a development in their entrepreneurial self-efficacy through enhancement of their entrepreneurial abilities and competencies, however, they were less successful in doing this than those who received the offline education. It can be concluded that online entrepreneurship education is less effective than offline entrepreneurship education in regard to producing the anticipated entrepreneurial outcome.

Considering the limited financial resources available to higher education institutions, it is recommended to reconsider their pedagogies, for example, incorporating the hybrid learning into their systems, hence overcoming the shortcomings of both online and offline entrepreneurship education.

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A Contribution to the Interpretation of Organizational Resilience (OR) Based on the Analysis of key Drivers and Conceptual Elements

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Abstract: Organizations are increasingly confronted with unexpected events, which can occur within or outside the organization and relate to various dimensions or aspects. The significance and extent of its impact on the organization can be quite surprising (Duchek 2020). Despite the fact that academic interest in this subject area has grown steadily in recent years, its conceptualization is not yet fully developed. There is no consensus on the meaning of resilience and the elements it contains. This paper contributes to the understanding and need for organizational resilience (OR) and also reveals gaps in its conceptualization. Resilience is understood as the ability of an organization "to repel, prepare for, consider, absorb, recover from and adapt ever more successfully to actual or potential adverse events. Those events are either catastrophes or processes of change with catastrophic outcome which can have human, technical or natural causes." (Thoma 2014) In order to survive in an uncertain environment and promote future success, organizations must be able to deal with all these manifestations of the unexpected and catapult themselves out of the crisis. They have to develop a capacity for resilience that enables them to react appropriately to unexpected events and to make capital from events that could potentially threaten the survival of an organization (Lengnick-Hall et al. 2011; Duchek 2020; Denyer 2017; Aguilar 1967). In literature and practice, there are various approaches to OR, which consist of phase models that also allow an assessment of an organization's resilience using a maturity model. From the examined methods in this paper it follows that the resilience capability is questioned only after occurrence of an adverse event and no "preparation phase" according to the Fraunhofer resilience cycle exists. This ex post approach endangers not only the competitive position, but also the existence of an organization. Therefore, organizations must build resilience even before such an event occurs.

Keywords: organizational resilience, OR, adverse events, resilience cycle

1. Introduction

Organizations are increasingly confronted with unexpected events, such as natural disasters, terrorist attacks or technical failures. Such events can occur within or outside the organization and relate to various dimensions or aspects. The significance and extent of its impact on the organization can be quite surprising (Duchek 2020).

To survive in an uncertain environment and promote future success, organizations must be able to deal with all these manifestations of the unexpected. They have to develop a capacity for resilience that enables them to react appropriately to unexpected events and to make capital from events that could potentially threaten the survival of an organization (Lengnick-Hall et al. 2011).

Organizational Resilience (OR) is the subject of research in various fields, including management, ecology, psychology, sociology, engineering, and interdisciplinary between these fields. Despite the fact that academic interest in this subject area has grown steadily in recent years, its conceptualization is not yet fully developed. There is no consensus on the meaning of resilience and the elements it contains. Most studies merely point to organizational characteristics, resources or processes that appear to be significant for resilience (e.g., (Weick 1993; Kendra and Wachtendorf 2003; Gittell et al. 2006). Resilience is simply treated as a result of organizations performing well in times of crisis or recovering from interruptions (e.g., (Horne and Orr 1997). However, this does not describe the whole picture: it is still unclear what resilient organizations actually do and how OR can be achieved in practice (Boin and van Eeten 2013; Duit 2016).

Therefore, different definitions of OR will be investigated to finally developed a working definition, which serves as the basis for the further course of the study. Subsequently, the drivers of resilience will be analyzed to highlight the need for OR. The main focus is on the conceptualization of resilience and evaluation possibilities. Finally, four actual OR models will be analyzed and the strengths and weaknesses of these models will be identified.

OR consists of an endless cycle without a permanent static state. This enables a dynamic reaction to constant changes and adaptation to unforeseen events as well as a holistic approach to security and is shown in the figure below (Thoma 2014).

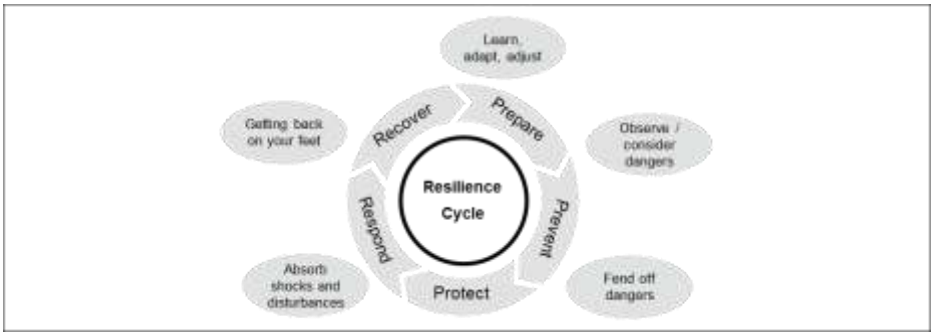

Figure 1: Resilience cycle, own illustration according to (Thoma 2014)

The cycle comprises five phases of resilience: prepare, prevent, protect, react and recover. In the first phase (prepare), thorough preparations are made for adverse events, especially with regard to early warning systems. The reduction of the underlying risk factors is intended to make it possible to prevent at least some of these adverse events from happening in the first place (prevent). If such an event does occur, the next phase is to ensure that the physical and virtual protection systems function properly in order to minimize the negative effects (protect). It is also necessary to provide fast, well-organized and effective disaster relief. This requires that the system maintains its basic functionality as far as possible (respond). When the actual adverse event is over, it is important that the system is able to recover and learn the relevant lessons from what happened to be better prepared for future hazards (recover) (Thoma 2014).

2. Definition of terms

OR has its origin in psychology. This strength-related phenomenon was transferred to companies in the course of the High Reliability Organization Theory, which focused on flexibility and adaptability (Ritz 2014). In psychology, resilience is the ability to overcome emotional and mental burdens (stress) without causing persistent mental disorders or stress disorders. Synonyms in everyday language are: Elasticity, resistance, robustness, toughness or the "stand-up man effect". According to Kalisch, resilience means: "staying mentally healthy despite (burdensome) stress" (Pelz 2020).

Organizational resilience, in contrast to psychological resilience, is the ability to fend off actual or potential adverse events, to prepare for them, to take them into account, to cope with them, to recover from them and to adapt more and more successfully. Adverse events are catastrophes or processes of change caused by human, technical or natural factors that have catastrophic consequences (Scharte et al. 2014). The following table provides further definitions of OR.

Table 1: Further definitions of organizational resilience

Name of Organization	Definition
Cranfield Universität	Organizational resilience is the ability of an organization to anticipate, prepare, respond and adapt to creeping changes and sudden interruptions in order to survive and grow.
BS65000: Organizational Resilience	Organizational resilience is the ability of an organization to anticipate, prepare for, respond to and adapt to everything from small everyday events to acute shocks and chronic or incremental changes.
Res Orgs	Organizational resilience is the ability to survive a crisis and grow in a world of uncertainty. Resilience is a strategic capability. It is not only about surviving crises. A truly resilient organization has two other important capabilities - the ability to anticipate and situate in order to prevent the emergence of potential crises, and the ability to turn crises into a source of strategic opportunity.

Name of Organization	Definition
Australian Government	Organizational resilience refers to the ability of a company to adapt and evolve in line with the evolution of the global market, to respond to short-term shocks - natural disasters or significant changes in market dynamics - and to shape itself to respond to long-term challenges.

In this paper, the working definition of Thoma (2014) is followed, which is based on the resilience cycle and defines resilience as follows:

> *"Resilience is the ability to repel, prepare for, take into account, absorb, recover from and adapt ever more successfully to actual or potential adverse events. Those events are either catastrophes or processes of change with catastrophic outcome which can have human, technical or natural causes." Thoma (2014)*

3. Drivers of organizational resilience and relevance

While the concept of resilience has a long tradition in some disciplines (especially psychology), it is relatively new in economic and management research (Duchek 2020). But why does an organization need to build resilience? It can be attributed to three main reasons, namely:

- **To deal effectively with unexpected events:** The sustainability and viability of organizations are more often threatened by the impact of unexpected internal/external events (e.g. macroeconomic shocks, natural disasters, terrorist attacks or technical failures) and short-term changes (e.g. state of emergency rules and subsequent change in the law as in Covid-19), (Aguilar 1967; Duchek 2020).
- **To promote future success:** In the fast-moving global marketplace (e.g., sweeping technological innovations in the digital age), it is more important than ever for companies to have the ability to change before a potential technological change occurs, before the change becomes desperately obvious, so that the potential profitability of the core business is not permanently impacted or a huge loss of assets is avoided (Denyer 2017).
- **To catapult out of the crisis:** The company's ability to maintain or restore a rapidly stable condition that allows it to maintain its normal functioning during and after expected or unexpected disruptions (Duchek 2020).

This section addresses the following two questions in order to deepen the understanding of the need for organizations to strengthen their resilience:

- **Conceptualization:** How is OR understood?
- **Evaluation possibilities:** How is resilience evaluated in practice?

Conceptualization: Resilience can be understood in three different ways, as:

- *a) Characteristic of an organization* (i.e. something an organization has). How is organizational resilience understood as characteristic of an organization?
- Capability, capacity and skill to deal with internal and external changes, risks or impacts (Ruiz-Martin et al. 2018).
- A function of three abilities or skills: Adaptability, situational awareness and management of keystone vulnerabilities (McManus et al. 2008).
- Business flexibility, adaptability, agility and efficiency (Erol et al. 2009 - 2009).
- Adaptability, responsiveness, sustainability and competitiveness (Gunasekaran et al. 2011).
- Emerging characteristic that the organization exhibits when it encounters setbacks (Burnard and Bhamra 2011; Hilton et al. 2012 - 2012)
- Process of recovery after a disruption (van Breda 2016)
- Quality to respond to significant changes (Horne and Orr 1997)
- Dimensions: operational and strategic. Operational resilience is understood as a way to recover after a crisis. Strategic resilience is not only about recovering, but also about turning threats into opportunities (Välikangas and Georges L. Romme 2012)

- *b) Result of the organization's activities* (i.e. something an organization does). How is organizational resilience understood as the result of the activities?
- The maintenance of positive adjustment under challenging conditions so that the organization emerges stronger and more creative from these conditions (Sutcliffe and Vogus 2003; Vogus and Sutcliffe 2007 - 2007).
- A reliable organization can return to its performance level on any key performance metric (Sheffi 2007).
- The organization is able to achieve its goals and realized opportunities in the presence of predicted or unforeseen disruptive events (Hilton et al. 2012 - 2012; Whitehorn 2010; Wright et al. 2012).
- *c) Measure of the disturbances/shocks* that an organization can tolerate (Ruiz-Martin et al. 2018). How is organizational resilience understood as a measure of the disturbances/shocks?
- Resilience is the degree of disruption that an organization can tolerate and yet survive (Linnenluecke and Griffiths 2010; Mamouni Limnios et al. 2014).

Evaluation options: How is resilience evaluated in practice?

The evaluation options can be divided into the same three streams as the conceptualization. This means, that the evaluation can take place on the basis of the 1) characteristics of the organization, 2) results of the organization, 3) recovery of an organization from disturbances/shocks. The following table summarizes these evaluation possibilities.

Table 2: Evaluation possibilities of organizational resilience

Characteristics of the organization
Measurement using a variety of different **indicators**: For example, to measure situation awareness – these indicators assess the level of awareness of expectations, commitments and constraints (McManus et al. 2007, Seville 2009, Whitehorn 2010, Lee et al. 2013). Measurement based on **8 points** but without a scale: e.g. (1) organizational transparency, (2) understanding risk dependencies, (3) developing profitability studies in the organization, ... (Starr et al. 2003) **Tompkin's** (2007) Five R's: Robustness, Responsiveness, Resourcefulness, Rapidity and Redundancy **Sanchis & Poler** (2013): to measure resilience based on the vulnerability of the organization, its adaptability and its ability to recover. **Kohno et al** (2012) proposed to assess resilience by considering the areas where the organization's facilities are located, the infrastructure the organization needs, the organization's facilities and supply chains. **Apneseth et al**. (2013) proposed to assess the organization's resilience based on the organization's ability to assess, monitor, respond, anticipate and learn
Results of the organization
Watanabe et al. (2004) proposed to use operating sales income as an indicator **Dalziell & Mcmanus** (2004) proposed measuring resilience using Key Performance Indexes (KPIs) defined with business objectives in mind; the authors did not specify the elements, attributes, components or KPIs to be measured. **Afgan** (2010) proposed an index to measure resilience based on the change in corporate profit, the change in total corporate income, the change in product costs and the change in the workforce. **Markman & Venzin** (2014) proposed to measure resilience based on return on equity (ROE) and volatility; **Jackson** (2007) proposed to measure resilience potential using the statistical correlation between small and large incidents.
Recovery from disturbances / shocks
Measuring resilience on the basis of how a company recovers from a failure has the drawback that the organization must suffer mistakes in order to assess its resilience. Therefore, this method is only valid/usable after the organization has suffered some shocks. **Henry & Ramirez-Marquez** (2010) proposed to measure resilience quantitatively, as the ratio of recovery to loss. **Erol, Henry, Sauser, et al**. (2010 - 2010) proposed to measure resilience by recovery time, level/degree of recovery, degree of restoration, initial vulnerability and potential loss averted.

4. Models and methods

In this chapter, the different models of OR are analyzed. For this purpose, elements that are available in all models were determined to structure the analysis. When analyzing the OR models, a brief description of the approach is followed by an examination of the phases/structure and the maturity levels. Based on the authors'

many years of experience, this is followed by a summary and analysis of the model's strengths and weaknesses as well as a comparison of the models.

Four actual models that meet the criteria in section 3 were selected for the analysis. These are: PwC-Managing COVID-19, Organizational Resilience Management Maturity Model – ORM3, BSI 2020 – 1, 4Sight

4.1 PWC-Managing COVID-19

4.1.1 Approach description

In the context of the impact of the Covid-19 pandemic, PwC has developed a tool for procedural positioning within the crisis, identifying seven archetypes, which is illustrated in Figure 2. These archetypes are clusters of companies that share common characteristics and are expected to survive and recover from crises in a similar way. This structuring approach can help companies determine what is needed to develop an appropriate strategy.

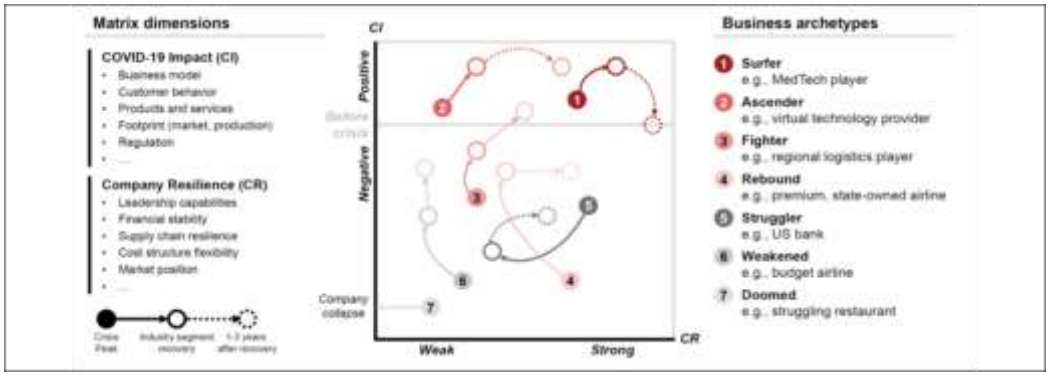

Figure 2: PwC structuring approach for organizational resilience (PWC 2020)

4.1.2 Phases / structure

Before, during or after a crisis, different strategic priorities are pursued, depending on the business model. The measures are divided into four time periods: The area of *Respond* should only be understood in the short term and as an ad-hoc strategy. While the phase *Recover* is pursued as a medium-term strategy, the subsequent *Reimagine* and *Transformation* phases are intended as medium- to long-term recommendations for action. (PWC 2020)

4.1.3 Maturity levels

The model distinguishes seven maturity levels, which are called archetypes. They describe clusters of companies that have similar characteristics and can survive unforeseen events in a similar way. The following table provides a description of the characteristics of the individual archetypes in their respective phases. (PWC 2020)

Table 3: Descriptions of the seven archetypes and their corresponding time periods, own illustration according to PWC 2020

	Respond	Recover	Reimagine	Transform
1. Surfer	Stabilize your supply chain to meet high demand	Capture learnings and reinvest additional profit in strategic fields	Reimagine your extended enterprise	Invest in R&D, technology and M&A
2. Ascender	Define and communicate your unique selling proposition to gain market share	Capture growth to strengthen resilience systematically	Unleash the full potential of newly identified customers and use cases	Strengthen your resilience, while investing in R&D and technology
3. Fighter	Cut costs extensively and manage cash carefully; resolve unpopular issues	Increase operational excellence and refocus your sales organization	Shift growth priorities and develop plan to address them quickly	Invest in new capabilities and reshape your cost structure
4. Rebound	Cut costs extensively and manage cash carefully; resolve unpopular issues	Prepare for timely ramp up and capture lessons learned	Apply capabilities-driven strategy approach to increase coherence	Streamline your portfolio and organization to increase resilience
5. Struggler	Cut costs deeply and manage cash closely; resolve unpopular issues	Fundamentally restructure and define new pint of profitability	Challenge entire business model set-up	Perform company-wide transformation
6. Weakened	Manage cash in a drastic way	Right-size and fundamentally restructure	Challenge entire business model set-up	Perform company-wide transformation or exit
7. Doomed	Not applicable	Not applicable	Not applicable	Not applicable

4.2 BCI – Organizational Resilience Management Maturity model (ORM3) (Gracey 2020)

4.2.1 Approach description

The BCI presented a holistic model for determining the degree of resilience maturity at the "Netherlands & Belgium Conference" in 2019. The model is used to analyze companies in terms of OR on five levels: *Business Assurance, Business Agility, Business Planning, Business Structure* and *Business Development*. These 5 strands are formed around the principles of business vision, organizational culture and adaptive leadership. (Gracey 2020)

4.2.2 Structure and maturity levels

The five named strands serve as the basis for an analysis and determination of the resilience maturity and are operationalized by five further subdivisions, which are displayed in the following table:

Table 4: Subdivisions for operationalization of the five strands, own illustration according to Gracey 2020

Business assurance		Business agility		Business planning		Business governance and structure		Business development	
AS1	Insurance	BA1	Hazards and consequences	BP1	Business intelligence frameworks	BS1	Roles and responsibilities	BD1	Staff engagement and involvement
AS2	Internal and external situation monitoring and reporting	BA2	Connectivity awareness	BP2	External connectivity	BS2	Internal recourses	BD2	Communications and relationships
AS3	Risk management and planning	BA3	Corporate security frameworks	BP3	Long term performance planning requirements	BS3	External resources	BD3	Research, innovation and creativity
AS4	Robust processes for identifying and analyzing vulnerabilities	BA4	Adaptive decision making	BP4	Information and knowledge collection frameworks	BS4	Silo mentality management	BD4	Continuous improvement frameworks
AS5	Recovery priorities	BA5	Exercising	BP5	Operating and licensing frameworks	BS5	Corporate social responsibility	BD5	Staff talent and succession planning framework

Subsequently, the subcategories and the strategic elements of leadership are analyzed, reviewed and assigned based on the following six maturity level distinctions:

Table 5: Matrix model for process assessment, own illustration according Gracey 2020

	Level 5 Industry	Level 4 Organizational	Level 3 Dept / Function	Level 2 Localized	Level 1 Ad-hoc	Level 0 Non-Evident
Strategic Element			XX		X	
Business Assurance			XX	X		
Business Agility		X	X	X		
Business Structure		X	XX			
Business Planning		XX	X			
Business Development		XXX				

The results of the evaluation of the respective subcategories are then combined with the maturity level characteristics in a matrix model. In this way, the company is able to make a more precise process assessment of the individual strands on the one hand, and the model also provides a holistic overview of the OR maturity. (Gracey 2020)

4.3 BSI model for organizational resilience (BSI 2020)

4.3.1 Approach description

The BSI model for OR consists of the three core elements "product excellence, process reliability and human behavior", the three critical business functions "operational resilience, supply chain resilience and information resilience" and the three benefits "strategic adaptability, agile and robust leadership". It is presented as an endless cycle (see Figure 3), where OR can only be ensured through the continuous pursuit of excellence. (BSI 2020)

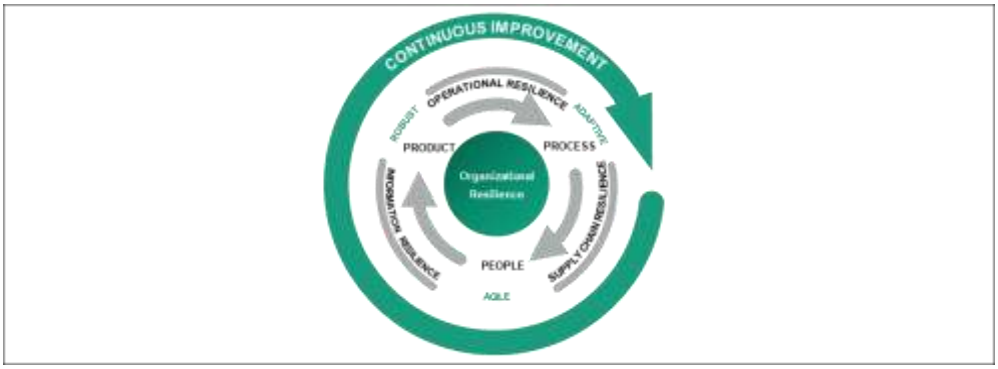

Figure 3: BSI-Model for organizational resilience, own illustration according to BSI 2020

4.3.2 Phases / structure

The model divides the OR requirements into the following three core elements:

- **Product excellence** refers to any product, service or solution that an organization brings to market in order to generate revenue.
- **Process reliability** refers to the embedding of habits of excellence in the development of products, services and market introduction. Organizations need a systematic approach to quality. Business-critical processes must be robust and compliant not only within an organization itself, but also throughout the supply chain.
- In terms of **human behavior**, an organization's people, culture and values determine its business success. From an ethical and social perspective, interaction with the environment, civil society and partners in the supply chain plays a particularly important role in the perception of a company's image. (BSI 2020)

The combination of these three elements is designed to enable the customer to achieve the best possible overall result, thereby both gaining *customer loyalty* and *building trust* and *long-term relationships* with all stakeholders.

4.3.3 Maturity levels

The three advantages of resilience resulting from the model are **strategic adaptability**, **agile leadership** and **robust leadership**. Strategic Adaptability refers to the ability of organizations to deal with changing circumstances in a dynamic, networked world while remaining true to a common goal. Agile leadership is about taking appropriate risks with confidence and responding quickly and appropriately to both opportunities and threats. Robust leadership, on the other hand, can be defined as accountability across organizational structures and hierarchies, based on a culture of trust, transparency and innovation. (BSI 2020)

4.4 4Sight model (Denyer 2017)

4.4.1 Approach description

BSI has developed the "4Sight" methodology to examine the requirements for OR. It is particularly useful for dealing with complex problems such as designing a new software application, developing a new technology, planning a new infrastructure system, implementing a major change program or managing a crisis. The 4Sight methodology describes a repeatable process that uses creative thinking to address these challenges and problems. It comprises four core processes (see Figure 4): (Denyer 2017)

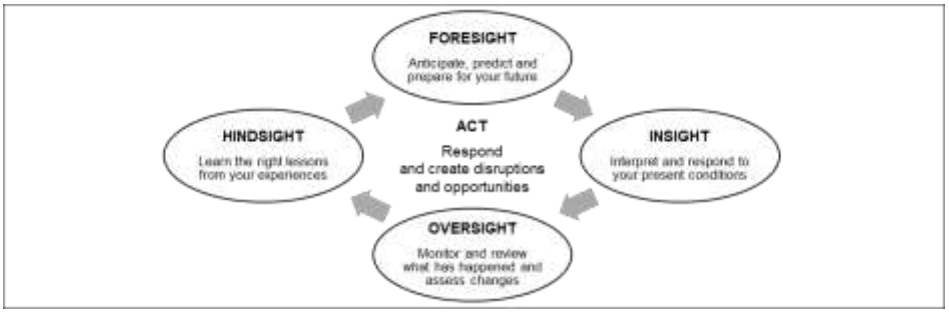

Figure 4: 4Sight method for organizational method, own illustration according to Denyer 2017

4.4.2 Phases and maturity levels

According to BSI, research and thinking on OR has developed in various areas over the last 40 years. Five different phases with five contrasting perspectives can be identified. The first two phases were driven by a defensive perspective focused on loss avoidance and value preservation:

- **1. Preventive control**. OR is achieved through risk management, physical barriers, redundancy (capacity reserves), system backups and standardized procedures that protect the organization from threats. These parameters allow it to "recover" from disruptions and to restore a stable state, i.e. **defensive + consistent.**
- **2. Mindful action.** OR is created by people who perceive and react to threats and respond effectively to unfamiliar or challenging situations. i.e. **defensive + flexible.**

However, OR is not only about learning to "jump back", but also about the ability to "jump forward" to grow and succeed in the future. There are two further phases and perspectives in this area as well:

- **3. Performance optimization.** OR is created through continuous improvement, refinement and expansion of existing competencies, improvement of working methods and the use of current technologies to serve current customers and markets, i.e. **progressive + consistent.**
- **4. Adaptable innovation.** OR is created by creating, inventing and exploring unknown markets and new technologies. Organizations can be the disruption in their environment, i.e. **progressive + flexible.**

Thinking about OR was divided into defensive behaviors (preventing bad things from happening) and progressive behaviors (making good things happen), and between consistent and flexible behaviors. The differences between these perspectives and behaviors have led to disagreements and misunderstandings. As a result, a new, fifth way of thinking about organizational resilience has emerged that is integrated, balanced and seeks fitness for purpose.

- **5. Paradoxical thinking**. OR is achieved by balancing **preventive control, mindful action, performance optimization** and **adaptive innovation**, and by dealing with the tensions inherent in these different perspectives.

To ensure resilience, the tension between the four approaches must be manageable. (Denyer 2017) The 4Sight methodology complements Demming's established Plan-Do-Check-Act (PDCA) methodology from 1986. However, while PDCA provides consistency and is well suited for continuous improvement of existing systems and processes, 4Sight provides the flexibility to deal with the large, complex issues that organizations constantly face in today's business world. The whole framework is displayed in Figure 5.

The PDCA method is to be used when the issue is easy to identify and define, it is solvable using current expertise and known solutions, and has a defined breakpoint when the solution is reached so that an assessment can be made. The application of the 4Sight method is particularly suitable when the issue is difficult to reconcile or easy to deny, requires new ways of thinking, beliefs, roles, relationships and approaches and there is no breakpoint that says when enough is enough. So, there is no right or wrong, only better or worse results. The PDCA method and "4Sight" are therefore not contradictory but complementary. Together they provide a structured framework for understanding and tracking both continuous improvement and innovation and allow the impact of disruptions to be mitigated. (Denyer 2017)

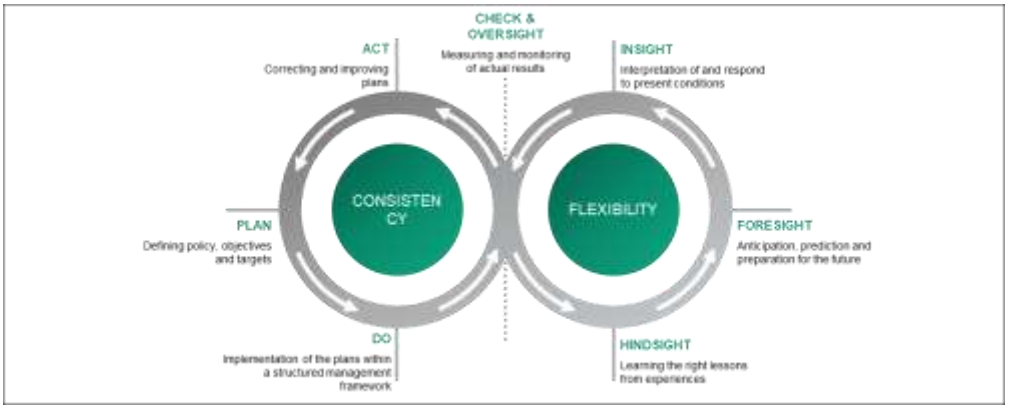

Figure 5: Linking of PDCA and 4Sight method in context of organizational resilience, own illustration according to Denyer 2017

4.5 Strength and weaknesses

The most common methods for OR consist of phase models that allow the organization to be assigned to one of the different phases. Among the models studied, only ORM-3 is not a phase model. The PwC and ORM3 methods also allow the assessment of an organization's resilience using a maturity model. A matrix is used for this purpose. The BSI and 4Sight methods are less suitable for assessing OR. They do not describe an exact maturity level, but rather a process approach that only offers the division into resilience phases and also describes characteristics of a resilient organization.

The PwC model enables a clear and detailed classification of organizations into the individual maturity levels and allows them to identify and build on their weaknesses. The Protect and Prevent phases of the resilience cycle are partially reflected in the Reimagine and Transform phases of the PwC model. However, the Prepare phase does not exist at all, so that organizations are not prepared for possible catastrophes/adverse events. Thus, the model only intervenes when such an event has already occurred.

The ORM3 model is a holistic structured approach, which is particularly suitable for assessment purposes. By means of a matrix, the organization can be evaluated according to certain predefined criteria and assigned to a maturity level. This enables the organization to identify weaknesses and build on them. However, this is a rather extensive evaluation with a rigid structure, where time and cost aspects should be considered. Furthermore, there is no indication for a "preparation phase", so that it can be assumed that the model will only be used after an adverse event has occurred.

The BSI model represents an endless cycle in which OR can only be ensured through the continuous pursuit of excellence. No maturity levels are described as such. Only the three advantages that can be generated by resilience can be achieved as a kind of maturity. These are not mutually exclusive but should be strived for as a sum. The model does not offer any evaluation possibilities for organizations.

4Sight is a holistic model that complements Demming's PDCA cycle. It provides a structured framework for continuous improvement. Furthermore, the model provides for the investigation of requirements for OR to be always prepared for possible disasters and is particularly suitable for the treatment of complex problems.However, there is no possibility of an evaluative classification into one of the maturity levels.

In addition, the methods presented have in common that the resilience ability is only questioned after the occurrence of an adverse event and that there is no "preparation phase" according to the Fraunhofer resilience cycle. Preparations for future disasters/shocks are therefore only made after they have occurred and can be seen as a kind of "lessons learned". The following table shows a summary comparison of the four models.

Table 6: Comparison of the models

Model	Framework description	Maturity levels	Assessment
PwC	The PwC structuring approach consists of seven maturity levels, which are represented in a portfolio with the axes CI (Covid-19 Impact) and CR (Company Resilience).	7 maturity levels (archetypes)	possible

Model	Framework description	Maturity levels	Assessment
	→ phase model		
ORM3	The ORM3 model comprises five strands, which serve as the basis for an analysis and determination of the resilience maturity and are operationalized by five further subdivisions. → no phase model	6 maturity levels	possible
BSI	The BSI model for organizational resilience consists of the three core elements, the three critical business functions and the three benefits, which are presented as an endless cycle. → phase model	3 resilience advantages as a kind of maturity	Not possible
4Sight	The 4Sight methodology describes a repeatable process with four core processes. → phase model	5 maturity levels	Not possible

5. Conclusion

Since the 2000s, OR research has increased significantly and is still a very important and topical issue. There is no uniform understanding of resilience and thus a wide variety of resilience concepts. Conceptualization and evaluation depend on the respective conceptual perspective and definition. From the literature, two trends in OR research have emerged:

- Process approaches that define different levels / degrees of resilience and deal with the dynamics of resilience
- Studies on resilience skills that provide insight into the organizational skills and routines that make up resilient companies (Duchek 2020).

In the methods presented, it was also found that the resilience ability is only questioned ex-post, i.e. after the occurrence of an adverse event, and is handled as a kind of "lessons learned". Thus, a "preparation phase" according to the Fraunhofer resilience cycle does not exist. However, reality has shown that this approach not only endangers the competitive position, but also the existence of an organization. Ex-post reactions and preparations for adverse events can therefore only be managed in a few cases without serious disruptions. Resilience research is not yet completed and needs to be expanded to include models that detect such adverse events before they occur.

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Backdrop of Research and Innovation in South Africa: Implications for Fourth Industrial Revolution

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Abstract: This study explores the opportunities for South Africa to promote economic activities in the context of the fourth industrial revolution. Hence, the study examined science, technology & innovation (STI) as the main driver of the fourth industrial revolution. Meta-analysis was conducted to elicit information from key government policy documents on STI since 1994 to check the political will of South Africa's government. Grey literature from government departments were also reviewed to examine the strength of South Africa's Research and Innovation System. Based on the assessment of data and information gathered, the study concludes that though strong institutions characterize South Africa's research and innovation system, but the relatively low intensity of linkages and interaction among the key actors of the innovation system continues to pose a threat to South Africa taking a leadership position to significantly contribute to the fourth industrial revolution. However, strong coordination among South Africa's financial, human, natural, physical, and institutional resources will situate the country in a position to develop the necessary capabilities for the fourth industrial revolution.

Keywords: industrialization, innovation, innovation system, STI policy, fourth industrial revolution

1. Introduction: Structural change and industrialisation

The business environment has recorded a paradigm shift in the way it operates. Entrepreneurs and newer firms entering older industries are causing significant disruptions in the market, in some cases, creating new markets while destroying the existing markets. The older firms will have to adjust to these changes or soon successfully would die. Indeed, competition is getting fiercer by the day, and all businesses must learn to innovate or perish. Today, the business world has already moved into the digital age where humans and machines interact to bring about greater productivity. Indeed, conventional ways of doing work involving a large amount of labor are phasing out gradually and increasingly being replaced by machines, robots, software, amongst others. This industrial change/revolution in the way business operates has been referred to in recent literature as the Fourth Industrial Revolution or Industry 4.0. The fourth industrial revolution involves using digital technologies such as artificial intelligence, sensor technologies, and automation in production (manufacturing) or business operation.

The industrialization has been considered an engine of growth and essential for economic development through the transformation of productive structure and the movement of factors of production to higher productivity and more complex activities (Szirmai, 2012; Bell et al. 2018). "Structural transformation is a change in the sectorial composition of output and employment contributing to higher economic growth and increased utilization of underutilized resources, especially labor" (Tregenna, 2015). This relocation of jobs and capital between firms leads to changes in total productivity (Dosi and Nelson 2010).

2. Global history of industrialization

From history (Atkeson & Kehoe 2001; Crafts, 2004; Sadeghi, Wachsmann & Waidner, 2015), the first industrial revolution started in the early1900s with mechanical production powered by water and steam, while the second industrial revolution started in the early 20th century, which resulted in mass production powered by electricity. The third industrial revolution was known to have taken place off in the 1970s, which resulted in electronics and automized production. The first and second industrial revolutions were characterized by physical systems, i.e., involving machinery and equipment. In contrast, the third industrial revolution was characterized by cyber systems, i.e., premised on virtual systems (less physical). The fourth industrial revolution that just started off is characterized by the combination or interaction of both physical and cyber systems, making it special. This fourth industrial revolution is branded by Artificial Intelligence, Robotics and Autonomous Systems, Modelling and Simulation, Additive Manufacturing, Augmented and Virtual Reality, Data Analytics, amongst others (Ong, 2008; Posada, *et al.,*2015; Li *et al* 2017)

The fourth industrial revolution allows humans and machines to work together in such a creative way that the outcome will surpass the output of humans working alone or machines working alone as it has been in the

previous industrial revolutions. However, on the other hand, this paradigm shift in how the industry will now operate (due to digitization) comes with many advantages and disadvantages. While digitization will create new job opportunities for high technology industries, it will lead to massive job losses for low and medium-low technology jobs, increasing the employment rate in South Africa.

Small and Medium Enterprises (SMEs) are now beginning to fully recognize the importance of disruptive technologies (Gabrielli & Balboni, 2010). Disruptive technologies have proven to an effective and efficient tool for businesses to operate and market in our modern-day world, coupled with the fact that it is more efficient considering output per unit of labor and operation labor cost per unit of time (Moyle, 2012; Taiminen & Karjaluoto, 2015)

3. Technological change and structure transformation

Technological innovation produces new products and new processes, disrupting the market demand (Lipsey et al., 2005). However, it has been noted that the rate technological change and innovation differ between sectors, thus providing different stimulus for growth.

Tregenna (2015) highlights that the manufacturing sector has been seen to have a specific role in long-term structural transformation and development. Manufacturing has broader productive linkages with other sectors, and it is typically associated with positive spillovers. It is also likely to be related to more advanced activities in services and agriculture, such as design, engineering services, and industrial techniques to agricultural production (Bell, Toga, Mondliwa, Roberts,2018). Manufacturing provides unique opportunities to exploit static and dynamic economies of scale. CSID (2010) also notes that manufacturing is more backwardly integrated to all other industries and stimulates potential in the economy than with service. Service is more backwardly dependent on manufacturing as a source of demand. Similarly, UNIDO (2013); Palma (2015); Rodrik (2015); Tregenna (2011; 2015); Haraguchi, Cheng, and Smeets (2017) find that manufacturing remains critical for economic development and an engine of growth and other manufacturing sector remains critical for high-quality employment generation (UNIDO, 2013). Sandven, Smith, and Kaloudis (2005) note that conventional thinking is that structural change within manufacturing entails shifting from low-technology to high-technology manufacturing (UNCTAD,2016).

4. Routes to innovation-aided industrialisation

4.1 Route 1: Stages approach

The primary process of catching up at the early stages is through learning from foreign direct investment or original equipment manufacturing (OEM) buyers (Lee, 2005). He notes firstly that key technology is embodied in imported machinery and equipment, and during this stage, countries learn (operational skills) by operating the plant imported from abroad. This, he notes is referred to as skills formation and leads to increase productivity which is the primary source of structural transformation (Lee, 2005). Hobday (2003) notes that in East Asia, the original equipment manufacturing system's growth in electronic exports was driven by the original equipment manufacturing system, particularly South Korea, Taiwan, and Hong Kong. Through the OEM system, firms could move from simple tasks to complex technological intensive activities in an incremental manner. Country-specific characteristics influence industrial development at this stage, resulting in wider volatility in development performance (UNIDO, 2017).

Early-stage stages of industrialization tend to be dominated by low-tech manufacturing labour intensive which has high development potential in terms of employment (UNIDO, 2017). At the early stages, the skill levels required by the existing manufacturing sub-sectors may be relatively low, although on-the-job learning and experience can improve productivity. In the intermediate state, latecomer firms can design imitatively existing products or plants. Lee (2005) notes that firms tend to resort to technological learning or transfer from foreign direct investment partners in the next stage. At this stage, the ebb and flow between labour intensive and capital intensive become more apparent, as there is an increasing decline in labor-intensive sectors (UNIDO, 2017).

Although the first two stages tend to be relatively easy and are happening in developing countries, very few developing countries reach beyond stage two to the third stage (Lee, 2005). At the mature stage of development, industrialized countries move into knowledge-intensive industries. These knowledge economies are directly based on the production, distribution, and use of knowledge and information and growth of investment in high-

technology investments and more high-skilled labor and associated productivity gains (OECD, 1996). Changes in technology and information technology make educated and skilled labour more valuable and unskilled labor less (OECD, 1996). Lee (2005) notes that firms have established a certain degree of in-house R&D capacity at this stage, supplemented by a private-public R&D consortium, a co-development contract with foreign R&D technology specialist firms, and/international M&A.

4.2 Route 2: Leapfrogging

Historically catch-up has entailed a progressive learning process by latecomers in terms of skills, knowledge, technology, and innovation. However, recent technological and innovation advances mean that catch up may no longer be a productive route to take but industrialization and development may be achieved through "leapfrogging" that bypasses the intermediate stages of technology through which countries have historically passed during the development process (UNCTAD, 2018). They are two critical distinctions between leapfrogging through the development of new technology or the adoption of technology being developed elsewhere. A few countries have managed to leapfrog. Korea and Taiwan Province of China have achieved rapid economic growth through leapfrogging. But some developing countries continue to struggle to leapfrog. The development of new technology requires the learning of modern technology and the accumulation of indigenous technological capability in innovation and technological know-how for production and investment in physical infrastructure (UNCTAD, 2018).

Further, the development of upstream industries requires a manufacturing pedestal with innovation capability, which is habitually lacking in developing countries (UNCTAD, 2018). Thus, leapfrogging must be done according to a country's competences and level of technological strength. Also, the ability to endure that course of leapfrogging depends on infrastructure, institutional capacity, and other sources of externalities that are deficient in many developing countries.

5. Assessment of South Africa's STI landscape for the fourth industrial revolution

This section monitors and evaluates South Africa's STI policy (since 1994 -post-apartheid till date), intending to provide feedback on South Africa's readiness to take a leadership role in the fourth industrial revolution.

- Developing the South African National System of Innovation (NSI)

After independence, South Africa relied on its 1996 White Paper on Science and Technology. The adoption of this white paper showed that South Africa appreciated the importance of systems and institutions-based framework for policymaking. This was evidenced by strengthening existing institutions and creating new institutions such as the Technology Innovation Agency (TIA), National Intellectual Property Management Office, the Department of Science and Technology (DST), And others. The period after the adoption of the white paper also witnessed increased Private-Public Partnerships and increase policy support for Small Micro and Medium Enterprises (SMMEs). There was also a consensus regarding the importance of SMMEs in driving the innovation process necessary for economic development and growth. This is evidenced by the increased public support for to businesses through the Research and Development Tax Incentive.

The adoption of the 1996 white paper also heralded the adoption of sectoral strategies to strengthen and develop the NSI. Such sectoral strategies were complemented with National policies such as the Nine-Point Plan for the economy. The STI policy then became increasingly incorporated into government strategies, programmes and projects. While positive progress has been made at the setting up of institutions, building and strengthening NSI relationships, and facilitating coherence of STI programmes, there remain many challenges. It was found that the innovation system in South Africa is still weak and fragmented. This fragmentation remains the most significant challenge for South African policymakers, according to the 2019 STI White paper.

- Expanding the research system and developing high-level skills

According to the 2019 White paper for science and technology, the government continues to strengthen the country's research system through strengthening existing institutions responsible for knowledge production and creating new ones where necessary. Through the National Research Foundation, South Africa has provided grants, bursaries, and incentives to university staff and students. Also, South Africa Research Chair Initiative has been expanded as more chairs have been award to researchers (particularly females) over the recent years. Also, more Centres of Excellence for specified research have increased significantly in response to South Africa's STI policy.

- Advancing South Africa's innovation performance

While South Africa's STI policy recognizes the strategic importance of advancing the innovation performance of the country, innovation performance remained relatively flat since when the 1996 White paper was enacted. The 2016 Global Innovation Index noted that South Africa is strong in market sophistication, innovation investment, knowledge absorption, and knowledge impact. However, patenting remains an area yet to be developed, as South Africa remains a net importer of technology. On the other hand, the 2019 White Paper reported that South Africa recorded a substantial increase in start-up companies. This development could signal the potential growth in innovation outputs to serve a technologically advanced economy, positively affect South African technology balance of payments, and address some of South Africa's social challenges. Also, the White paper recorded that there has been an increase in the number of R&D tax incentive applicants. The government's technology localization programme is also contributing to the competitiveness of local firms, particularly small and medium enterprises (SMEs). Hence, the future looks bright.

- Increasing the financial resources of the NSI

The substantial increase in investment in STI played a central and critical role in the development of the South African national system of innovation. Since 1994, South Africa has also recorded an increase in both public and private STI resources. The STI expenditure by the Department of Science and Technology has increased nine-fold. But despite these investments, the research intensity (Gross Expenditure on Research and Development as a percentage of GDP) stagnates at 0.7%. This is far below the recommended 2%. In South Africa, private investment remains the major contributor to Gross Expenditure on Research and Development.

6. Review of the South African NSI for the fourth industrial revolution

When compared to other African countries, the South African National System of Innovation may be viewed as relatively advanced. However, there are still systemic weaknesses in the framework. The pre-NSI policy and institutional environment were driven by objectives such as military dominance (in a regional context), food security (in terms of national security), and energy self-sufficiency.

In 1994 the government specified the previous Department of National Education into three: (i) Education, (ii) Sports and Recreation, and (iii) Department of Arts, Culture, Science and Technology (DACST). One of the major roles of DACST was reviewing government-funded science, engineering, and technology institutions. This resulted in the introduction of performance measurements and investigations such as the National Research and Technology Audit, the Science, Engineering, and Technology Institutions Review, the National Research, Technology Foresight study, and Kaplan and Norton scorecard. The National Innovation Fund, the Biotechnology Strategy, the Department of Science and Technology were established to promote R&D. The post-apartheid era came up with a policy instrument, the "*Reconstruction and Development Programme* (RDP)," which was essential for every planning and budgeting in South Africa. A National System of Innovation approach was established as the framework within which Science and Technology policy would be developed and directed towards achieving national socio-economic targets.

White Paper became the fundamental of policy on science and technology, and it addressed some failures requiring concerted national action. These weaknesses include:

- "A fragmented and inadequately coordinated Science and Technology system.
- The erosion of innovative capacity.
- Poor knowledge and technology flow from the science base into the industry.
- Poor networking both within the region and in the global context.
- Inefficiencies and poor levels of investment in research and development.
- Imbalances created by past policies and actions.
- A poor competitive position within the global environment.

While the new white paper prosed the following policy direction proposed:

- Creation of clear channels for capacity building, science and technology, human resource development, and inequity redress.

- Establishment of mechanisms to re-allocate government spending according to new priorities to promote innovative solutions, particularly related to problems of the disadvantaged.
- Processes that will challenge government research institutions to derive more support from competitive sources of funding.
- Processes that will achieve efficiencies in R&D spend by promoting the diffusion of research and technology development results.
- Introduction of processes allowing longer-term perspectives in planning and budgeting for R&D.

The intervention provided by the White Paper process covered six themes:

- Promoting competitiveness and job creation.
- Enhancing the quality of life.
- Developing human resources.
- Working towards environmental sustainability
- Promoting an information society.
- Producing more knowledge-embedded products and services".

As the economy became more technologically informed, the White Paper emphasized the need to restructure higher education to deliver the required knowledge, training, and research. Hence focus on science, engineering and technology became intense. Also, Science, Engineering, and Technology Institutions (SETIs) were encouraged to seek funding, primarily from the private sector. Funding from the government also facilitated linkages between SETIs, strengthening the links between science (institutions) and industries.

After the apartheid era, the South Africa government developed a new structural adjustment policy of fiscal discipline and privatization of state assets. This policy gradually led to the substitution of labor with technology, reducing employment, especially in the mining and manufacturing industry. There was a total shift from a closed economy controlled by the government to an open economy.

Consequently, the NSI insufficiently supported a transition from a firm reliance on a resource-and commodity-based economy to one that would be characterized by value-adding and knowledge-intensive activities. The NSI had some fundamental challenges. There seemed to be only limited horizontal coherence and integration between agencies in the NSI. There was no coordinating body at the national level to devise and monitor national-level strategies for innovation and marshaling the resources needed. The National Council on Innovation (NACI), the body that should be coordinating the NSI, was hamstrung because it reported to the Department of Science and Technology and not the presidency. And thus, NACI had no structural location that would afford it the authority needed to coordinate a national system effectively.

Another main challenge was that the business sector did not adequately participate in building the NSI. While the business sector accounts for more than half of the research intensity in South Africa, the business sector only makes funds available for researchers and students to do their research. The business sector needs to be more strategic in the way they fund research. Research funding needs to be problem based and should not be done haphazardly. Research should be demand driven (based on the needs in the industry) and not supply (to increase the overall amount of knowledge generated in the country).

7. Evaluations of South African STI Policy for the fourth industrial revolution

The 1996 & 2019 White Papers on STI

While the 1996 White paper on S&T policy in South Africa led to South Africa's NSI, the While Paper still had many challenges. For instance, a report published by the OECD (2007) highlighted that there many factors which are still constraining NSI performance, such as lack of policy coherence and coordination, which still presents challenges for South African policymakers. Moreover, the report notes that there is still insufficient business and civil society involvement in the innovation process. Similarly, the report notes that there are inadequate high-level SET and technical skills in the economy. Lastly, the report highlights how the minor nature of the South African research system coupled with a constraining business environment poses limitations for innovation activity. The persistence and continuance of these challenges warranted the renewal of the 1996 South African

White Paper on S&T by adopting the 2019 White paper on STI. The purpose of the 2019 white policy was to address these challenges from the 1996 White Paper and optimize the role of innovation in achieving South Africa's goals for society and the economy.

The 2019 White paper aims to use science, technology, and innovation to enable inclusive development in a changing world. As such, the 2019 White paper recognizes the exclusionary outcomes of the 1996 White paper.

The guiding principle of the 2019 white paper is that innovation can shape a different South Africa. For South Africa to become a winning nation in STI and for STI to realize its potential as a driver of economic growth and development, this White Paper proposed various policy shifts. These include the following:

- "Increasing the focus on inclusivity, transformation, and linkages in the NSI.
- Enhancing the innovation culture in society and government (adopting a whole-of-government approach to innovation).
- Institutionalising approaches to improve policy coherence and programme and budget coordination in the NSI.
- Instituting monitoring and evaluation systems.
- Developing an enabling environment for innovation.
- Including and supporting civil society and business, with a focus on SMEs, in government planning and funding.
- Developing local innovation ecosystems.
- Supporting social and grassroots innovation.
- Improving the human resource development pipeline and instilling an innovation mindset from basic to tertiary education.
- Developing the next generation of researchers and ensuring that PhD graduates fit the needs of the economy.
- Endorsing open data, open science, and open innovation approaches.
- Supporting inter-and transdisciplinary approaches to knowledge development
- Prioritising a pan-African STI agenda.
- Increasing investment in the NSI and optimizing the productivity of these investments".

Within this shifting global environment, the 2019 White paper places innovation at the forefront of helping South Africa address its socioeconomic challenges successfully adapt to the changing global landscape. South Africa's extent to achieving these developmental goals would depend on the active collaboration between the private, public, academia, and civil society. The White paper, therefore, emphasizes a quadruple helix approach and recognizes that the innovation outcome of the country would depend on strengthening the networks and relationships between institutions.

Evidence-based policymaking is at the forefront of the 2019 white paper on STI. Evidenced-based policymaking would require the setting up a completely new STI government agenda, the increased collaboration of all STI partners, and the increased participation of all stakeholders to facilitate the learning and implementation of policy and specific STI initiatives. The 2019 White paper further recognizes the importance of creating an environment conducive to realizing the potential benefits of STI. This necessitates addressing skills shortages, creating and enabling an atmosphere for business development and growth.

Lastly, the 2019 White paper highlights the importance of creating a society, which values knowledge and understands the impact of innovation on national development priorities. At a broad level, the objectives of the 2019 White paper were to take advantage of the opportunities presented by megatrends. Encourage evidence policymaking by expanding what has worked, proposing new approaches with failures.

8. Conclusion: Is South Africa ready for the fourth industrial revolution?

Based on the policies reviewed, South Africa still operates mainly with the 'linear model of innovation' that focuses on increasing investment research and development and creating strong science and technology organizations/institutions. The broader view of the innovation system emphasizes the linkages and interactions within the system. South African research and innovation systems comprise actors and institutions typical of a mature innovation system. However, the connections and interactions among the actors and stakeholders within the system are weak. Scholars have stressed the importance of collaboration among government, business, industry, research institutions, including science councils and universities, and the public.

Government has an important role to play in creating an enabling environment for knowledge development and innovation. Government should make the right external framework conditions necessary for innovation. These external conditions include macro-economic stability, social context, political milieu standards, funding, among others. Apart from this, through policies and suitable instruments, the government must ensure the supply and mobility of knowledge workers: human resource development, immigration law, networking mechanisms. Furthermore, the government needs to encourage the promotion of knowledge exchange/flows within the innovation system. Another essential role of government will be to ensure the timely provision of knowledge infrastructure (public research organizations, provision of scientific and technological services, provision of research and communication infrastructure). In addition to those mentioned above, the government will need to ensure that timely monitoring and evaluation are done as the government provides that its policies are based on evidence.

Universities have played a crucial role in knowledge generation, but in South Africa, the outputs are more supply-driven rather than demand-driven. Hence, the vast amount of research/knowledge/technology produced over the years has not sufficiently harmonized to the necessities of the NSI. Another main challenge is that the receipts for South African technology abroad are very low compared with those of developed countries. Therefore, there is a considerable gap between payments for technology from abroad and receipts.

The Business sector also has a vital role in preparing the innovation for the fourth industrial revolution in South Africa. However, South Africa's GERD/GDP ratio hovers around 0.8%. The business sector (including state-owned entities) accounts for at least half of this South Africa's research intensity. Hence, the kind of research done or being funded by the business sector plays a vital role in the overall development of South Africa.

The study thus concludes that while strong institutions characterize South Africa's research and innovation system, the relatively low intensity of linkages and interaction among the key actors of the innovation system continues to pose a threat to South Africa taking a leadership position to significantly contribute to the fourth industrial revolution. The implementation of policies must follow the broad view of innovation system which encourages collective production of knowledge, technology, and innovation by all the actors/elements/stakeholders of the innovation system. As against, focusing on building strong research and development institutions with specific mandates, working in isolation. The study puts forward that strong coordination among South Africa's financial, human, natural, physical, and institutional resources will help South Africa build capacity to leapfrog, in order to be a global contributor to the fourth industrial revolution.

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The Role of Digital Orientation and Market Orientation in Generating Marketing Capability in SMEs

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Abstract: Marketing capability is a valuable resource for a firm, and it has a role in firm performance and new product development. Thus, firms with high marketing capability test and introduce innovations to the market, outperforming firms with low marketing capability. Digitalization has however transformed the ways firms create value. Firms need a strong digital orientation combined with a strong market orientation to take advantage of the new opportunities of digital technologies. Both of these strategic orientations can explain superior performance in marketing capability, as they form the bases for new product development and market intelligence, and direct the marketing behaviors of a firm. This is important especially in SMEs who struggle with fewer resources. This research examines the impact of digital orientation and market orientation on marketing capability in SMEs building on the resource-based view (RBV) and dynamic capabilities theory in testing the effects of digital orientation and market orientation on marketing capability. In addition, the moderating effect of firm size is tested. Data for the research was collected from Finnish SMEs. It consists of 242 answers from CEOs or the owners of the firm. Data was analyzed with stepwise linear regression analysis. The results show that both digital orientation and market orientation have a positive and significant relationship with marketing capability. The impact of digital orientation is moderated by firm size; its effect on marketing capability increases when firm size grows. Firm size has also an effect on marketing capability indicating that smaller firms have fewer resources. The whole model explains 45 percent of the variance in marketing capability. This research indicates that both digital orientation and market orientation are important factors explaining why some firms outperform others in marketing and innovation. This research suggests that organizations' strategic orientations explain its capability, and equip SMEs to compete in the environment.

Keywords: marketing capability, digital orientation, market orientation, SMEs

1. Introduction

Strategic orientations can be seen as "the guiding principles that influence a firm's marketing and strategy-making activities" (Noble, Sinha and Kumar, 2002). They are reflected in firm's culture and guide interactions with the marketplace. The effects of different strategic orientations on firm performance have been examined in prior research, e.g. the effect of market orientation (Verhoef et al, 2011; Narver and Slater, 1990; Pelham, 2000; Matsuno, Mentzer and Özsomer, 2002), the effect of entrepreneurial orientation (Rauch et al, 2009; Wiklund and Shepherd, 2005; Covin, Green and Slevin, 2006), and the effect of technology orientation (Hakala and Kohtamäki, 2011; Gatignon and Xuereb, 1997). Recently, Aydi and Jarboui (2020) showed that entrepreneurial orientation and market orientation are positively related to the performance of international new ventures. However, Hakala and Kohtamäki (2011) state that different research streams have developed their own orientation constructs, but little research has examined the combinations of the orientations together. This research contributes to this by examining the simultaneous effects of two strategic orientations; market orientation and digital orientation.

As prior research has shown, firm's strategic orientations can have a direct effect on firm's performance (Kirca, Jauachandran and Bearden, 2005; Aydi and Jarboui, 2020), but they can also contribute to organizational learning (Slater and Narver, 1995) and building dynamic capabilities (Zhou and Li, 2009). Joensuu-Salo et al (2018) showed that market orientation has a vital role in building marketing capability in SMEs, and for internationalized firms, market orientation and marketing capability were crucial to their success in foreign markets. Also Aydi and Jarboui (2020) found that market orientation combined with entrepreneurial orientation generate marketing capacities and international performance. Marketing capability is a valuable resource for a firm, and it has a role in firm performance and new product development. Thus, firms with high marketing capability test and introduce innovations to the market, outperforming firms with low marketing capability. The concept of marketing capability can be seen in the light of resource based view (RBV) and dynamic capabilities view, in which competitive advantage is based on the possession of valuable and rare resources, and the ability of a firm to adjust its processes so as to utilize resources effectively in a dynamic business environment (Barney, 1991; Cavusgil, Seggie and Talay, 2007). As markets become increasingly complex, marketing capability is even more important; the ability to learn from market information, to experiment flexibly, and to market in a way that builds relationships (Day, 2011).

In addition to the importance of market orientation in building marketing capability in a firm, firm's digital orientation can also have a major role. Digitalization has transformed the ways firms create value (Autio, 2017). Firms need a strong digital orientation combined with a strong market orientation to take advantage of the new opportunities of digital technologies. Both of these strategic orientations can explain superior performance in marketing capability, as they form the bases for new product development and market intelligence, and direct the marketing behaviors of a firm. This is important especially in SMEs who struggle with fewer resources.

The objective of this research is to examine the effect of market orientation and digital orientation in building the marketing capability in SMEs. In addition, the moderating effect of firm size is tested in the relationship between these two strategic orientations and marketing capability. The context of this study are Finnish SMEs.

2. Theoretical framework

2.1 Marketing capability, RBV and dynamic capabilities view

The concept of a resource-based view (RBV) of a firm has its origins in the theory of Penrose (1959) and was further developed by Wernerfelt (1984) and Barney (1991). According to Barney (1991) a firm's competitive advantage is based on valuable, rare, and imperfectly imitable resources and capabilities. RBV has been later complemented by a view emphasizing dynamic capabilities (DC), which highlights the ability of a firm to adjust its processes so as to utilize resources effectively in a dynamic business environment; in the DC view competitive advantage stems not just from resources but rather from new resource configurations based on dynamic capabilities (Cavusgil, Seggie and Talay, 2007). According to Day (1994), capabilities are complex bundles of skills and knowledge accumulated in the firm and applied in organizational processes. Day (1994) considers in particular the capabilities connected to understanding the markets and customer focused marketing capabilities central for market oriented firms. Sok et al (2017) describe marketing capability as "a firm's capacity to undertake marketing activities such as promoting the business, establishing position in the market, identifying target markets, conducting market analysis, promoting the business, setting and meeting sales goals, and setting and attaining profit goals". Marketing capability has been found to have positive effect on new venture survival (Patel, Feng and Guedes, 2021), and on firm performance (Joensuu et al, 2018). Thus, it is a valuable capability in a firm creating competitive advantage in the market place.

Firm size can have an effect on the firm's resources and capabilities. Ates et al (2013) argue that SMEs struggle with resources in terms of limited time, number of employees and financial resources. This all can limit marketing capability of a firm, as it requires several skills related to understanding of market opportunities, analysing market information, and positioning firm's products and services. Thus, the following hypothesis is presented:

> *Hypothesis 1: Firm size has a positive relationship with marketing capability; larger SMEs have higher marketing capability than smaller ones.*

2.2 Market orientation

Market orientation (MO) has been characterized from two different perspectives; cultural perspective and the behavioral perspective (Armario et al, 2008). According to Narver and Slater (1990) MO can be seen as a culture in a firm, which drives a firm toward the creation and delivery of superior value for its customers. Kohli and Jaworski (1990) represent behavioural perspective in MO, and define it as an organization-wide generation of market intelligence, entailing the processes of a firm implementing marketing concepts in practice (Kohli, Jaworski and Kumar, 1993). Armario et al (2008) remind that cultural and behavioural perspectives of MO are complementary: organizational culture generates capabilities and these capabilities are exhibited in certain market-oriented behaviors. Prior research has shown that MO has a positive effect on firm performance across contexts (Cano, Carrillat and Jaramillo, 2004; Kirca, Jayachandran and Bearden, 2005; Kohli, 2017).

Market orientation has an important role in the development of marketing capability in a firm. According to Morgan, Katsikeas and Vorhies (2012) and Day (1994) market knowledge is the foundation upon which marketing capabilities are built on, and market orientation generates market knowledge. MO can enhance marketing capability as it creates knowledge about customers, competitors, market trends, and regulation (Lavie 2006). Prior research has shown, that high MO is related to higher levels of marketing capability; e.g Vorhies and Harker (2000) found in their study that firms with high MO also had higher levels of the six marketing capabilities;

marketing research, product development, pricing, distribution, promotion and marketing management. Aydi and Jarboui (2020) found that marketing capability is generated through market orientation combined with entrepreneurial orientation. Thus, the following hypotheses are presented based on prior research:

Hypothesis 2: Market orientation has a positive relationship with marketing capability.

Hypothesis 3: Firm size moderates the relationship between market orientation and marketing capability.

2.3 Digital orientation

Digitalization is transforming the ways firms can create value (Autio, 2017). Digital technologies and infrastructures have widespread impact on the society. Kuusisto (2017) identified several effects of digitalization, such as changes in organizational learning, digital innovations, organizational agility, business ecosystems, and organizational structures. Digital orientation refers to "a firm's commitment toward application of digital technology to deliver innovative products, services, and solutions" (Khin and Ho, 2019). The concept of digital orientation is based on the ideas about technology-oriented firm by Gatignon and Xuereb (1997). Hence, a digital-oriented firm has the ability and the will to acquire new digital technologies, and use it in product development. Digital orientation makes firms more open to digital technologies and embrace digital initiatives (Khin and Ho, 2019).

The use of novel digital technologies can contribute to the development of marketing capability in a firm, as digital technologies can be used in analysing market information more efficiently, spotting new segments in the market, and developing innovative marketing campaigns. Coreynen, Matthyssens and Van Bockhaven (2017) state that digitalization can transform the communication interfaces with different stakeholders of the firm. Prior research has shown, that different areas of digitalization can generate marketing capabilities and performance, relating to e.g. online advertising (Mathews et al, 2016), social media expertise (Alarcón-del-Amo, Rialp-Criado and Rialp-Criado, 2018) and e-commerce adoption (Erdener, Ekrem and Veysel, 2005). The effect of digital orientation on marketing capability can be even more important when firm size grows, as larger SMEs usually have more customer segments to reach and more market information to analyse. Hence, the following hypotheses are presented:

Hypothesis 4: Digital orientation has a positive relationship with marketing capability.

Hypothesis 5: Firm size moderates the relationship between digital orientation and marketing capability.

3. Data and method

3.1 Data collection

The data was collected from Finnish limited companies from the South Ostrobothnia region. The initial sample consisted of 1005 companies identified from the Finnish Voitto+ database. Data were gathered through a web-based survey questionnaire sent to CEOs and firm owners between September 2019 and January 2020. After two data collection rounds, 306 responses were received with a response rate of 30.5 %. However, 64 observations were deleted from the dataset on account of the following errors: (1) companies did not provide other necessary information, like name, etc., (2) other missing values, and (3) duplicate answers from the same respondent. Accordingly, the final valid sample consists of 242 answers. The respondents were from various industries, including manufacturing: 37 %, services 43 %, commerce 13 %, and others 7 %. The level of analysis in this research is the company level. The studied firms employed between one and 209 employees (including the founder(s) where appropriate), with the average staff size being 15 employees. The annual turnover ranged from EUR 21,000 to EUR 85 million.

3.2 Variables

Marketing capability was measured following O'Cass and Sok (2014) with a nine-item scale adapted from Vorhies and Morgan (2005). A seven-point Likert scale was used where 1 equals "much worse than competitors" and 7 equals "much better than competitors". The items included:

- Item1: Doing an effective job of pricing products/services has been…
- Item2: Test marketing of new products/services has been…

- Item3: Launching new products/services has been…
- Item4: Attracting and retaining the best distributors have been…
- Item5: Developing and executing advertising and promotion programmes have been…
- Item6: Sales management has been…
- Item7: Analysing market information has been…
- Item8: Developing creative marketing strategies has been…
- Item9: Translating marketing strategies into action has been…

Market orientation was measured with adapted scale from Homburg and Pflesser (2000) with six items. The original scale was based on Kohli, Jaworski and Kumar (1993). Respondents were asked to indicate their level of agreement or disagreement with the following six statements with a 7-point Likert scale (1 equals totally disagree and 7 equals totally agree):

- Item1: We meet with customers at least once a year to find out what products or services they will need in the future.
- Item2: We poll end users at least once a year to assess the quality of our products and services.
- Item3: Marketing personnel in our firm spend time discussing customer's future needs with other staff functional departments.
- Item4: Data on customer satisfaction are disseminated at all levels on a regular basis.
- Item5: We periodically review our product development efforts to ensure that they are in line with what customers want.
- Item6: When we find that customers would like us to modify a products or service, we make concerted efforts to do so.

Digital orientation was measured with adapted scale from Khin and Ho (2019) and Zhou and Wu (2010) with two different sections. The first section covered two items and the second section five items resulting in a seven item scale. In the first section, respondents were asked to indicate their level of agreement or disagreement with the following two statements with a 7-point Likert scale (1 equals totally disagree and 7 equals totally agree):

- Item1: New digital technology is readily accepted in our organization
- Item2: We always look out for opportunities to use digital technology in our innovation

In the second section, respondents were asked to indicate the level of company's capabilities in the following areas with a 7-point Likert scale (1 equals very low capability and 7 equals very high capability):

- Item3: Acquiring important digital technologies
- Item4: Identifying new digital opportunities
- Item5: Responding to digital transformation
- Item6: Mastering the state-of-the-art digital technologies
- Item7: Developing innovative products/service/process using digital technology

Firm size was measured with the number of employees. It was changed to natural logarithm (ln) due to the non-normality of employee size (see Hoque and James, 2000).

Exploratory factor analysis was used to examine the scales. It showed that the first item of marketing capability scale had a low communality, and relative low loading on the scale, thus, it was removed from the final scale. The internal consistency and reliability of the final marketing capability scale with eight items was excellent based on Nunnally's (1978) recommendations, Cronbach's alpha being .93.

The items of market orientation scale had sufficient factor loadings ranging from .56 to .79, and Cronbach's alpha indicated a good reliability (.86). Digital orientation scale had originally two sections. Exploratory factor analysis showed that all the items loaded on one single factor, and factor loadings were high on the scale (ranging from .84 to .94). Cronbach's alpha indicated high reliability ratio (.96).

3.3 Analysis

Table 1 presents the correlations among the variables. Marketing capability correlates with digital orientation (.562***), market orientation (.558***) and firm size (.273**). Digital orientation and market orientation correlate with each other (.483***). In the next phase, linear regression analysis was used. We followed the recommendations of Hilbe (2009) and Menard (2010) in checking the suitability for using regression analysis (normal distribution of response and error terms, no autocorrelation, no homoscedasticity, and no multicollinearity).

Table 1: Correlations, mean, minimum and maximum values of the study variables

	Mean (sd)	Min/Max	MARKETING CAPABILITY	DIGITAL ORIENTATION	MARKET ORIENTATION
MARKETING CAPABILITY	4.1 (1.2)	1.1/7.0	1		
DIGITAL ORIENTATION	4.8 (1.5)	1.0/7.0	.582***	1	
MARKET ORIENTATION	5.1 (1.3)	1.0/7.0	.558***	.485***	1
SIZE (ln)	1.9 (1.3)	.00/5.34	.273**	.140*	.263***
*p < .05. ** p < .01. *** p <.001					

Podsakoff et al (2003) reminds that common method bias can be a potential problem when data for both the predictor and criterion variable are obtained from the same person in the same measurement context using the same item context and similar item characteristics. Common method bias can be examinated using Harman's single factor test: all of the studied variables are loaded into an exploratory factor analysis and unrotated factor solution is examined. The basic assumption is that if a substantial amount of common method variance is present, either a single factor will emerge or one general factor will account for the majority of the covariance among the measures. Harman's single factor test was used to control for the method bias. Exploratory factor analysis using principal axis factoring where the unrotated factor solution was examined, as recommended by Podsakoff et al (2003). Kaiser's criterion for retention of factors was followed. The sample size seemed to be large enough for the factor analysis, at least based on the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = .92). Factor analytic results indicated the existence of several factors with eigenvalues greater than 1.0. The first factor accounted for 25 percent of the variance. Since several factors, as opposed to one single factor, were identified and since the first factor did not account for the majority of the variance, a substantial amount of common method variance does not appear to be present.

4. Results

Linear regression analysis was used to examine the hypothesized relationships. In the first model, firm size, market orientation and digital orientation explain marketing capability. In the second model, the interaction terms of market orientation and size, and digital orientation and size were added in the model. Table 2 presents the results of linear regression analysis. Model A shows that all the independent variables in the model have positive and significant relationship with marketing capability, supporting hypothesis 1, 2 and 4. Firm size (β .140, p<.01), market orientation (β .320, p<.001) and digital orientation (β .398, p<.001) all explain marketing capability significantly, digital orientation being the most significant variable in the model. The model explains 44 percent of the variance in marketing capability. In the model B, interaction terms were added. Results show, that the interaction term of digital orientation and size is significant in the model, thus, firm size moderates the effect of digital orientation on marketing capability supporting hypothesis 5. When firm size grows, the effect or digital orientation on marketing capability grows. However, hypothesis 3 is rejected. The interaction term of market orientation and size is not significant in the model. The whole model explains 45 percent of the variance in marketing capability.

Table 2: Results of the linear regression analysis

	Model A B (sd.error) Beta	Model B B (sd.error) Beta
Firm size	.675** (.281) β .140	-.344 (234) β -.350
Market orientation	.311*** (.052)	.300*** (.092)

	Model A B (sd.error) Beta	Model B B (sd.error) Beta
	β .320	β .309
Digital orientation	.337 *** (.050) β .398	.185 * (.086) β .218
Interaction Market orientation x size		.010 (.050) β .058
Interaction Digital orientation x size		.090 * (.043) β 514
Adjusted R^2	.438	.451
F statistics	56.955***	36.293***
F change		3.380*
*p < .05. ** p < .01 *** p <.001		

5. Discussion and conclusions

The objective of this research was to examine the effects of market orientation and digital orientation on the marketing capability in SMEs, and test the moderating effect of firm size. Marketing capability is a valuable resource for a firm, and it has a role in firm performance and new product development. Thus, firms with high marketing capability test and introduce innovations to the market, outperforming firms with low marketing capability. Digitalization has however transformed the ways firms create value. Firms need a strong digital orientation combined with a strong market orientation to take advantage of the new opportunities of digital technologies.

The results of this study show that both of these strategic orientations explain superior performance in marketing capability, as they form the bases for new product development and market intelligence, and direct the marketing behaviors of a firm. This is important especially in SMEs who struggle with fewer resources. The results give support for the findings of Vorhies and Harker (2000), who found in their study that firms with high MO also had higher levels of marketing capability, especially relating to marketing research, product development, pricing, distribution, promotion and marketing management. The positive relationship between MO and marketing capability was also found by Joensuu-Salo et al (2018) in the context of internationalized SMEs and Aydi and Jarboui (2020) in relation to international new ventures. This suggests, that MO has a critical role in producing important information from customers and competitors to be used in marketing management in a firm.

Digital orientation has also an important role in creating marketing capability. SMEs with high digital orientation are ready to accept new digital technology and are constantly looking for opportunities to use digital technology in innovations (Khin and Ho 2019). Thus, SMEs with high digital orientation acquire important digital technologies and have the capability to master them. This has a positive effect for marketing capability, as digital technologies can be used in various areas of marketing management, i.e. sales, customer acquisition and engagement, and marketing research. Wang (2020) also showed that digital adoption creates digital marketing capabilities, which in turn contribute positively to performance. Drawing from the resource-based view, digital orientation can create rare resources in terms of capabilities. Eller et al (2020) also showed that digitalization is positively related SME resources, and through these resources, has a critical role in competitive advantage.

The results of this study show, that the impact of digital orientation is moderated by firm size; its effect on marketing capability increases when firm size grows. This indicates that digital orientation is even more important in larger SMEs. This is interesting, as Eller et al (2020) argue that SMEs lag behind larger firms when it comes to digitalization. This study shows that larger SMEs make more advantage of digital technologies in building marketing capability. It may be that larger SMEs have more customer segments and products to manage than smaller SMEs. Digital technologies offer ways to manage information and use it in different marketing processes.

Firm size has also an effect on marketing capability indicating that smaller firms struggle with resources. This supports the arguments of Ates et al (2013), who state that SMEs have fewer resources in respect to available time, employee skills, and financial resources. However, the findings of this research suggest that organizations' strategic orientations explain its capability, and equip SMEs to compete in the environment. Hence, both market

orientation and digital orientation are important factors building marketing capability and competitive advantage in SMEs.

There are some limitations in this study. The context of the study is Finnish SMEs in one region. Hence, the results can't be generalized. Future research could examine the roles of market orientation and digital orientation in marketing capability in different contexts, and compare the effects between large organizations and SMEs.

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Introducing art in Entrepreneurial Teaching: A Theoretical Framework

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Abstract: For a long time, a common ingredient of management education has been the use of case studies of real companies describing real circumstances. Thus, entrepreneurship education which draws upon the traditional business paradigm is based on real case studies to a large extent. Alternatively to the previous dominant stream of teaching, the present article focuses on the use of art in entrepreneurship education in accordance with Dewey's perspective for the utility of the aesthetic experience. To make entrepreneurial art-based teaching more systematic, three distinct levels for art adoption are introduced with different learning objectives and expectations. Accordingly, pieces of art can be used for entertainment, facilitating the classroom climate, for comprehension of concepts and skills and further, for reflection or critical reflection. The features of each separate level are discussed and examples from music, poetry, painting, literature, theatre or cinema are given. Furthermore, empirical evidence is sought from an elective course where students were free to choose either to elaborate a business plan or to work with a piece of art. Comparisons between the two groups indicate that the first group seeks for acquisition of business skills and knowledge whilst the second advocates gratification and deeper thinking on the notions. The preferences and expectations of the latter group are consistent with the present framework for art-adoption and provide insights for future research. Therefore, the article develops a theoretical framework for art-based teaching in entrepreneurship, supported by rudimentary empirical evidence, in order to motivate scholars and educators towards art adoption as learning innovation in entrepreneurial teaching.

Keywords: entrepreneurship education, education through art, experiential learning, reflective learning, critical reflection

1. Introduction

From the early guidelines to foster the entrepreneurial mindset through education (e.g. Oslo Agenda 2006) it has been well conceived that this type of teaching needs educational innovations. It is also well-documented that entrepreneurship education has been originated from Business Schools grounded on their teaching practices (Hindle 2007). After two decades of massive implementation across the globe, it is now accepted that at least three forms of entrepreneurship education co-exist in worldwide cross-disciplinary curricula, namely the 'about', 'for' and 'through' ones (Kakouris and Liargovas 2021; Lackéus 2015). The 'about' form is the oldest one entrenched on economic and management knowledge, the 'for' one is largely experiential based on management tools and techniques capable of cultivating entrepreneurial capacities, whilst the 'through' one tends to affect the attitude towards business venturing. Learning innovations of all types are crucial for the previous forms of entrepreneurship education in a different extent: most for the still underdeveloped 'through' mode and less for the traditional 'about' one. In order to meet the endeavour for successful delivery of entrepreneurial courses, educators have practiced with various innovative ways and tools to teach, e.g. games (Fellnhofer 2015, Hindle 2002, Huebscher and Lendner 2010), reflective videos (Wraae, Tigerstedt and Walmsley 2020), scenarios in classrooms (Fleck and Asmuth, 2021), real-life experiences (Lackéus and Williams Middleton 2015) and others. Yet, a rudimental search in the extant literature suggests that exploitation of art in entrepreneurial teaching has been scant.

Amongst the reasons for the poor exploitation of art-based teaching, not only for entrepreneurship but in many other subjects too (e.g. Burton, Horowitz and Abeles 1999), are: (a) the non-formality of these techniques which renders them unsystematic, (b) resistance from educators to include art in their teaching (e.g. Oreck 2004, Tanggaard 2011) and (c) lack of resources (e.g. Rooney 2004) or constraints from the curriculum which mandates the delivery of knowledge in limited time that is often inadequate for experiential learning methods. The aim of the present article is to confront the first of the previous obstacles by addressing a theoretical framework for the use of art pieces in entrepreneurship education. The relevant research question can be articulated as follows: "What are the objectives for introducing art into entrepreneurial teaching?" supplemented by a subsequent question: "What types of art pieces are appropriate for different learning objectives?" To our knowledge, this is a first attempt to systematically discuss art adoption in entrepreneurship education as a base for a plethora of learning innovations in the field.

The rest of the present article is organised as follows. First, a theoretical discussion tends to respond to the previous two research questions revealing a coherent framework for the adoption of art in entrepreneurial teaching. Second, empirical evidence is sought from an entrepreneurship course in Greece where students chose to work with art in their projects instead of the usual business plan. Through an open-ended questionnaire, the motives of students (choosing either business plan or analysis of art) are deduced. Finally, implications and future research are discussed in the last part of the article.

2. A framework for the adoption of art in entrepreneurial teaching

It has been unambiguous that research in entrepreneurship education has disclosed its experiential nature. Experience, under various definitions and meanings, has been a cornerstone for teaching and learning in entrepreneurship (e.g. Kakouris and Morselli 2020) while experiential learning approaches exhibit superiority in the formation of the entrepreneurial intention (Agapitou et al. 2010, Piperopoulos and Dimov 2015). Therefore, Dewey's learning-by-doing approach underpins the entrepreneurial pedagogy, especially in secondary education settings, whilst Hägg and Kurczewska (2020) contend that the full potential of pragmatist philosophy has not been exploited in entrepreneurial teaching so far. Nonetheless, experience has been highly associated with the practice and the everyday life of real entrepreneurs. Drawing from the tradition of Business Schools, much of entrepreneurship education relies on real case studies, narratives from successful entrepreneurs, mentorship in classrooms or incubators and in some cases on apprenticeship in businesses. In this way, practical knowledge and skills can be acquired but also the usual business routines can be reproduced, conveyed and reinforced. Thus, by utilising only some kinds of experience, excluding others, and without adequate deep-reflection on experience, innovative thinking and justification of personal beliefs and taken for granted assumptions can be averted.

It is maintained here that interaction with art offers the possibility for authentic experiential learning in entrepreneurship. Drawing back to Dewey's (1934) fundamental essay "*Art as experience*", experience is a part of the "continuous and cumulative interaction of an organic self with the world" (p. 220). Dewey considered the aesthetic experience wider and deeper than ordinary experiences since it involves not only cognition but also emotions and imagination (Goldblatt 2006). For Dewey, the *aesthetic experience* embraces all kinds of art unlike other philosophers (especially the German idealists) who have stressed *high-end art* as the most appropriate for teaching purposes. Dewey's approach has propelled "teaching through the arts" as a common practice in schools where integration of art in the curriculum supports "holistic growth and personality balance" of the students (Sotiropoulou-Zormpala 2012: 124) and can also assist the academic performance (Eisner 1998, Hetland and Winner 2001). This kind of pedagogy has been grounded on the works of Eisner (2002) and Efland (2002) along with Gardner's (1993) *theory of multiple intelligences*, which postulates that there are different ways to perceive experiences and the world and thus, art can be associated with mental functions different than the usual linguistic-verbal and logical-mathematical ones. A step further, Kokkos (2010) discusses the use of aesthetic experience, i.e. the systematic observation of artworks (Kokkos 2010: 157), in the context of transformative learning. Kokkos builds upon the ideas of Eisner, Broudy, Gardner, Perkins, Kant, Dewey, Sartre, Efland, Frankfurt School and Palo Alto Mental Research, which offer the theoretical pillars for the use of art in education, to develop a six-stage method entitled "Transformative Learning through Aesthetic Experience". Kokkos underlines that this approach facilitates, through the interaction between cognitive, emotional and imaginative dimensions, critical reflection and the holistic nature of transformative learning.

Rooney's (2004) literature review highlights that art-based teaching is more inclusive for specific learner populations and communities yet more efficient for diverse and multicultural learners. Therefore, art-immersed teaching favours interdisciplinarity and when implemented throughout the organisation it could support a school reform. In many cases, it concerns only a part of teaching usually assisted by a school's 'artist in residence' (e.g. Fogg and Smith 2002). It also pertains to teachers' training and their professional development. Rooney also underlines research findings for cognitive improvements and the development of learning abilities and thinking skills, such as creativity, problem-solving, elaborating ideas and others, with background neurobiological effects.

Based on the previous approaches, it can be supported that artworks can be employed in entrepreneurial teaching in three distinct levels summarised in Figure 1. Departing from the common 'artless' teaching in classrooms, i.e. the ground level of Figure 1, artworks can be adopted for stimulation (first level), for comprehension (second level) or for critical reflection (third level). These levels can be different as far as

different kinds of art can be associated with different objectives and learning outcomes. Once the differences between the three art adoption levels of Figure 1 are discerned, then art-based teaching in entrepreneurship could become more coherent and systematic whilst the different anticipated learning outcomes will appear more evaluable.

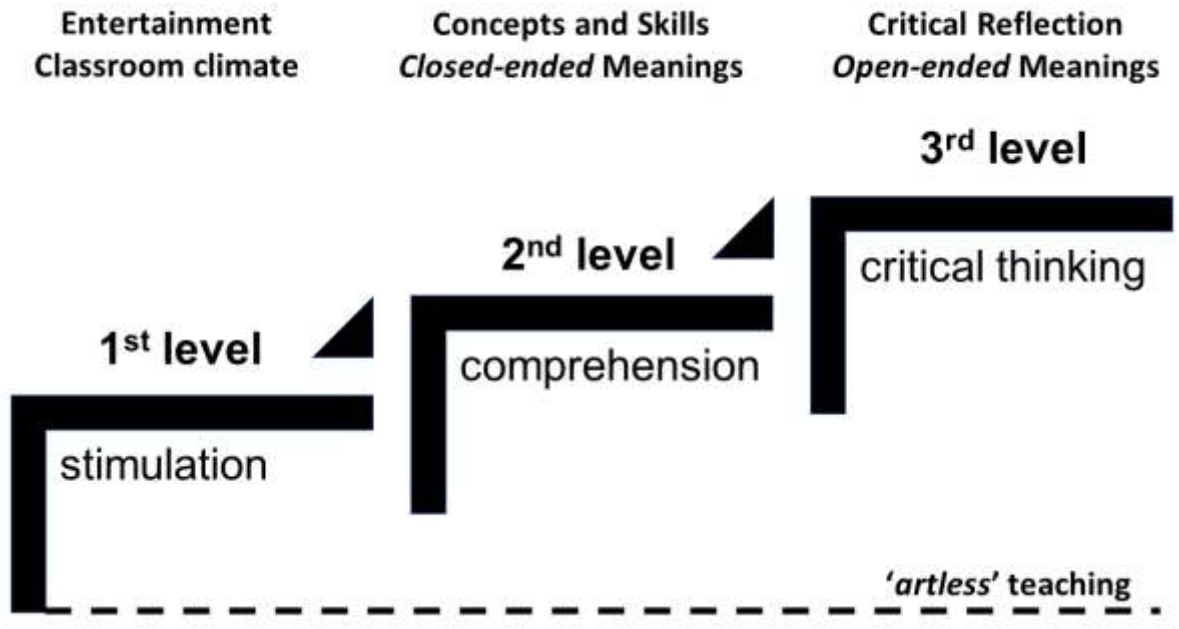

Figure 1: Three levels for art adoption in entrepreneurial teaching

Level 1: Art for stimulation and entertainment. A first use of art in teaching is to offer stimulation, to affect the classroom climate and thus the learning environment. As Rooney (2004: 6) remarks "Arts-based teaching and learning improves classroom and school climate". Background music, for example, when students study a case or work on a problem solution, can induce positive sentiments, increase concentration and offer gratification. It can also assist in phases of collective or self-reflection or in facilitating creative action (e.g. when scheduling a logo, a moto or any other promotional artefact). To this end, Rooney (2004: 6) remarks that adoption of artworks "improved climate and cooperation" and also "raised students' interest and motivation levels". Similar to Csíkszentmihályi's flow theory (Csikszentmihalyi 1990), one may assume that art adoption could increase students' engagement leading to "culmination of concentration, interest, and enjoyment" (Shernoff et al. 2014). No piece of art could be *ex ante* excluded from this process once the artwork is capable of capturing the students' interest. Popular art of all kinds attains this purpose since most of the students are accustomed with it. From "The new dork" of Jay-Z and Alicia Keys, Adele's "Skyfall", White Stripes' "Seven nation army", MacKlemore and Lewis' "Wings", Troup's "Route 66" (in its many variations) to classical music, music artworks can be adopted in order to enhance the classroom climate and inspire students. The same is possible when attractive paintings, photographs, graffities or dancing are projected.

***Level 2: Art for comprehension*.** Further to stimulation and entertainment, artwork can be used for comprehension of concepts and skills. According to Rooney (2004), the use of art contributes in "creative problem solving" (p. 6) inducing "affective and cognitive effects" to individuals (p. 7) Thus, artwork can be employed for cognitive purpose. This is in line with Efland's (2002) work on cognitive effects induced from visual arts due to the different processing of symbols in a holistic manner. The pieces of art have to convey specific (closed-ended) meanings associated with entrepreneurial concepts, skills and competencies. This adds to the previous level of art adoption the learning objective of comprehension, i.e. the examination through the interaction with the specific artwork (aesthetic experience) of one or more entrepreneurial concepts or competencies. The exposure to the artwork and consequent individual or collective reflection in classroom can lead to deeper understanding of the notion at hand. Balachandra (2019) also contends that principles of performing improvisation in the arts can instil students "improvisational alertness" which is very crucial for the performance of an entrepreneur in turbulent times. Movies like "The social network" (2010, David Fincher), "The founder" (2016, J. L. Hancock), "Joy" (2015, D. O. Russell) and others show the start-up or the growth phase of a new business; "Erin Brockovich" (2000, S. Soderbergh) enables understanding of sustainability issues and social

responsibility; songs like “Fast car” (Tracy Chapman), “Started from the Bottom” (Drake – clean version), “I Need A Dollar” (Aloe Blacc) can be easily associated with entrepreneurial motivation and difficulties faced in any start-up phase. The mere demand for this type of artwork is a straightforward connection with entrepreneurial concepts and skills and the extraction of concrete meaning-making on them. Thereupon, many types of art are appropriate (i.e. from popular to masterpieces). Nonetheless, careful selection of artworks has to be considered in order to avoid “narrow” or “biased” messages on entrepreneuring, promoted by the cultural media that can affect the students’ intentions. This case has been discussed under the term “entre-tainment” by Swail, Down and Kautonen (2014).

Level 3: Art for critical reflection. The last level for art adoption refers to critical reflection. The aim here is not a mere comprehension of a concept or the acquisition of a skill but the challenge of stereotypic views and the isolation of dysfunctional personal assumptions. Rooney (2004: 7) remarks that teaching through the arts can “develop a ‘higher order’ of thinking”. Such “higher-order” thinking is essential for the confrontation of assumptions and dilemmas as Kokkos (2010) addresses for the use of art in transformative education that is based on critical reflection. Since critical reflection is known to be difficult to emerge in practice, the educator’s role is very significant in encouraging it. Thus, the selection of artworks is important since they have to be critical in nature providing open-ended interpretations and multiperspective views that enable individual and collective reflection in depth. Kokkos recommends masterpieces as more appropriate form of art capable of inducing critical reflection. Thus, movies like “The Merchant of Venice” (2004, M. Radford) – if not the original play of Shakespeare – can enable reflection on the role and agency of funders or on entrepreneurial failure; novels like “The anarchist banker” of Pessoa offers possibilities for reflection on human interaction (individualism/collectivism); especially plays of Brecht, who introduced distancing in theatre, promote reflection on basic economical concepts (e.g. the “Song of Commodity”, Die Maßnahme); songs like “Money” from the movie “Cabaret” (1972, B. Fosse) induces reflection on profit making. The goal of using art in this level is through interaction with the artwork to re-examine any, initially posed, critical questions, learning disorientations and dilemmas.

The aforementioned “levels” for art adoption, summarised in Figure 1, address a framework for systematic adoption of art in entrepreneurial teaching. Once the objectives of each level are defined and understood, the selection of artwork is straightforward and the evaluation of the corresponding learning experiences is possible. In the next section we provide empirical evidence for teaching through the art and we also explore the learning motivations that lead students to select this form of teaching in entrepreneurship.

3. Empirical evidence from an entrepreneurial course in Greece

The use of art in entrepreneurial teaching was implemented during an entrepreneurial course in Greece offered as elective to foreign language and literature students in a Greek university. Students were asked to form groups (1-5 persons) to develop a project (evaluated by 70%): either (a) a typical business plan (BP) or (b) comprehending entrepreneurial concepts through analysis of art pieces. For the latter, the students freely chose entrepreneurial concepts, relevant questions and an appropriate piece of art. Through the analysis of art (aesthetic experience), they reflected upon the initially posed questions and concepts and derived answers and conclusions for them. Through a questionnaire, quantitative and qualitative data were collected. N=35 responses were received from which N1=23 provided by BP students and N2=12 from ART students. The sample consisted of 4 males and 31 females – a reasonable percentage given the population of literature and language departments. The average age of the first group was 31.74 years (SD=12.26) and 29.17 years (SD=13.39) for the second. Thus, the age populations of the two groups are comparable and higher that typical four-year students because many students in these departments follow a second Bachelors’ degree. The questionnaire sought students’ opinion for the adoption of art in teaching and learning motivations to choose art projects.

3.1 Comparisons between different kinds of teaching material

The respondents initially scored (1 Low to 5 High) the types of learning activities they consider more helpful to learn entrepreneurship. The most common types met in classrooms were included and the result is shown in Figure 2. We note that the BP group prioritises case studies followed by business plan, business games and documentaries considering art the lass helpful learning activity. In contrast, the ART group favours working with art but also preserves the same queue with the BP group for the rest kinds of activities. They also score higher, than the BP group, the use of documentaries and business games. These results are very reasonable and expected since the BP group believes in real cases and in practicing with the authentic start-up process (business

planning) whilst the ART group seeks for other intellectual activities that may lead them to a better understanding of entrepreneurial concepts without ruling out the utility of real cases and practicing with tools. Notably, using a 5-item Likert scale (Kakouris 2016), the entrepreneurial intention of the BP group was found significantly higher than the ART group – a result that explains the relevant preferences in Figure 1.

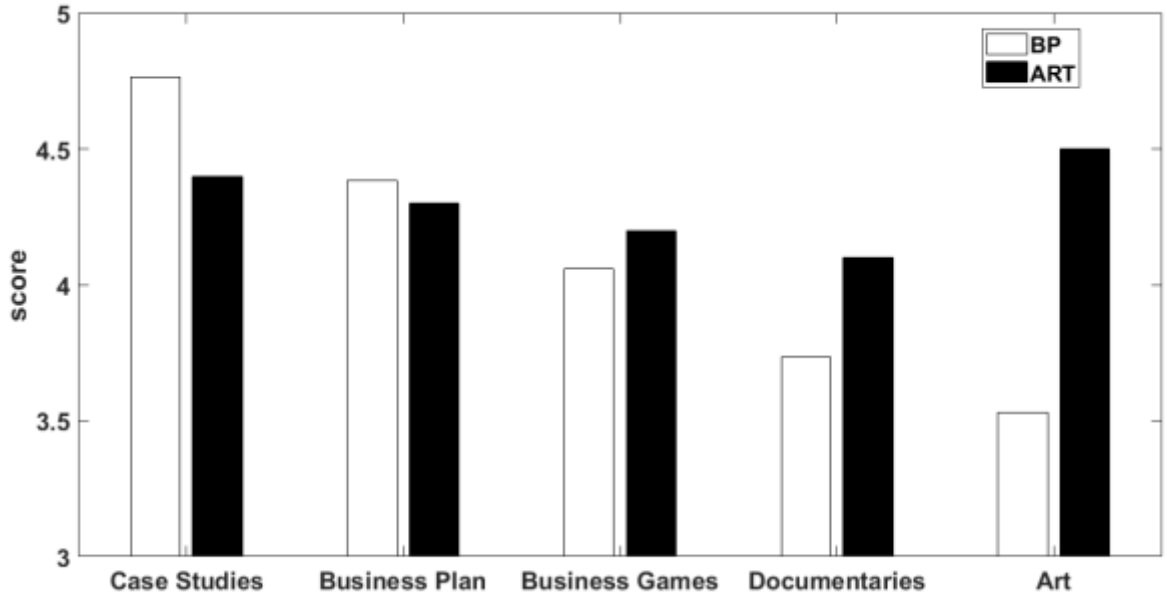

Figure 2: Comparison between business plan (BP) and art analysis (ART) students towards five teaching tools

3.2 Motivations and expectations from the chosen kind of project

The next part of the questionnaire sought the motivation of students to either prefer BP or ART for their project. Five items were scored through a five-point scale (1 Low to 5 High) and the result is shown in Figure 3.

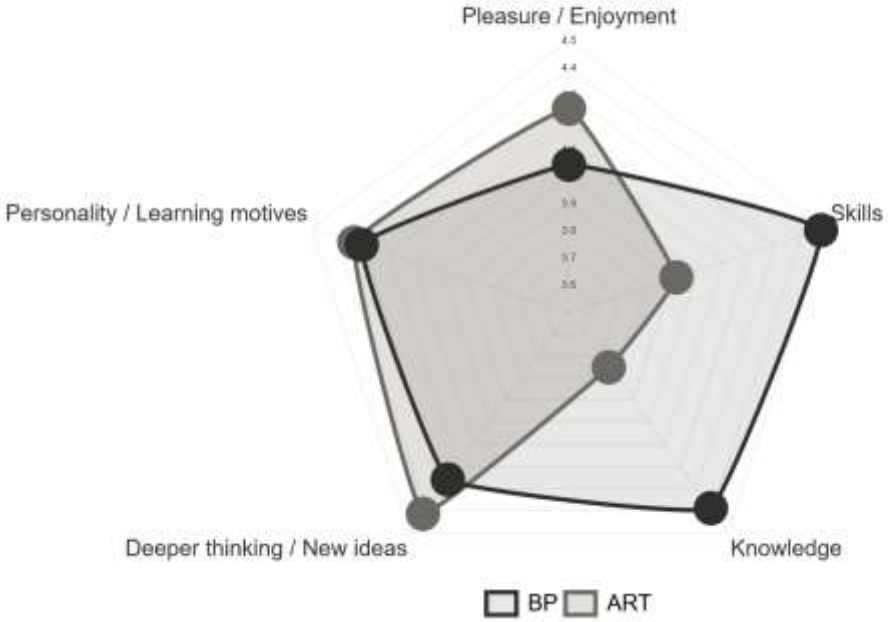

Figure 3: Comparison between business plan (BP) and art analysis (ART) students towards five selection criteria

The two groups score equally the item “This type of project suits my personality and my general learning preferences”. Thus, all respondents feel that the selected type of project suits to them. The items “to acquire specific skills” and “to acquire specific knowledge” are scored more intensively by the BP group compared with the ART group. In contrast, for the items “it offers enjoyment and gratification” and “it induces deeper thinking

and new ideas" the ART group scores higher than the BP group. These findings are fully consistent with the theoretical framework of section 2 for the adoption of art in teaching.

Since the comprehension of concepts and the acquisition of skills can be a learning objective for teaching through art (Level 2, Figure 1), the next part of the questionnaire asked students to name three skills and capacities they expect to cultivate through their projects. The results for the two groups are shown in Table 1. The most frequent skills in the BP group are collaboration and organisation followed by creativity, business planning, decision-making and forecasting. The ART group refers collaboration, critical thinking and teamwork, followed by creativity, consistency and analytical thinking. There are common skills due to the teamwork taking place in projects, but there are also certain differences between the skills that the two groups expect to acquire. Many of the ART group skills are intellectual and of special interest is the "objective reasoning" one. In-depth interviews are needed in future research to follow the skill acquisition expectations of students and their relevance to entrepreneurial learning.

Table 1: List of expected skills and capacities referred by each group of students

Group of Business Plan (BP)	Group of art (ART)
Collaborating, Organising, Creativity and creative thinking, Business planning, Decision making, Forecasting, Problem solving, Convincing, Resource management, Presenting, Conception of environmental conditions, Methodising, Structured thinking, Researching, Teamwork, Leadership, Coordinating, Initiative	Collaborating, Critical thinking, Teamwork, Creativity, Consistency, Analytical thinking, Innovative thinking, Patience, Observation, Communication, Objective reasoning

Finally, students who chose to work with art were asked to score (5-point scale, 1 Low to 5 High) different kinds of artwork they consider useful for entrepreneurial learning. They referred in descending order: Movies, Plays, Novels, Paintings, Music and Poems.

The findings of this section are empirical and explorative offering a first evidence for art-based teaching in entrepreneurship compared to the common business planning method. The aim of this evidence was to examine whether the students comply with the theoretical framework presented in section 2. Further research is needed in the future to explore the rest aspects of the theoretical framework and to develop it into a consistent model for art-based teaching in entrepreneurship.

4. Discussion and conclusions

In the present article we theoretically discussed art-based teaching in entrepreneurship supplemented by empirical evidence from an optional course in Greece to foreign language and literature students. The aesthetic experience as learning experience is fundamental in the work of Dewey, and thus, an underexploited means for experiential entrepreneurship education. Based on previous research for art adoption in various disciplines, we addressed a consistent framework (Figure 1) where art can be integrated in teaching for stimulation reasons, for comprehension or for critical reflection. These alternatives complement each other and offer possibilities for innovations in entrepreneurial teaching. To this end, the particularities of each implementation have to be understood in-depth in order to avoid fallacies due to misselection of artwork, loose association with leaning objectives, or replication of narrow messages and stereotypes circulated in mass and cultural media (e.g. Swail, Down and Kautonen 2014). Such pitfalls could undermine the role of art in teaching and downgrade art-based methods in entrepreneurship education. Hence, good examples and practices are needed in the future in order to leverage the full potential of aesthetic experience in entrepreneurial learning.

The empirical exploration in classroom showed that many students chose to work with art instead of other, more common, entrepreneurial activities. Perhaps this can be partly due to the field of study of these students (language and literature); however, entrepreneurship education evolves as an inclusive type of learning and thus it needs its own methods to reach diverse audiences. Especially the "through" mode of entrepreneurship education (e.g. Kakouris and Liargovas 2021), which aims at affecting the attitude, needs strong innovative tools to communicate entrepreneurial concepts to non-business-oriented audiences. In this case, "know-why" is more essential than "know-how". But even in business curricula, art-based teaching offers possibilities for reflection, sometimes critical reflection, that is essential to conceive barriers to business venturing, tacit assumptions and stereotypes. The empirical research showed that students who seek to exercise more intellectual skills advocate to interact and work with art pieces. Drawing upon the influence of art on multicultural settings (Rooney 2004), art-based teaching can be proven a powerful tool for context-aware entrepreneurship where entrepreneurial

concepts and methods have to be communicated to vulnerable and socially excluded groups where social and cultural norms have to be met (e.g. Fleck, Kakouris and Winkel 2020). Art-based teaching can be also important for trainers' training in entrepreneurship (e.g.).

In conclusion, a simple comparison of nowadays entrepreneurial courses, discussed in this article, with a decade ago ones in the same university setting (e.g. Kakouris 2008), shows how entrepreneurship education evolves cross-disciplinarily seeking learning innovations capable of effectively communicating the entrepreneurial mindset. This is a worldwide trend in which the adoption of art in teaching could offer a promising avenue for innovations in entrepreneurial learning through experience. To this end, future research could delve into systematic integration of teaching through art in entrepreneurship curricula.

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Innovative Client Acquisition Strategies for Freelance Language Professionals

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Abstract: Customer acquisition is the process of attracting new customers to a business, usually achieved through marketing activities. One of the main goals is to maintain a steady flow of new customers. This process is almost always costly. While there are many ways to acquire customers, some methods can be more easily identified than others. What freelance professionals always aim for, in comparison to SMEs and big companies, is to get as many customers as possible with the least amount of work and the minimum costs. This paper aims to define the methods used by freelance professional translators to acquire new clients. The efficient integration of new translators in the labour market, as well as the development of professional translators and their expansion into other markets, is a research field that has not yet been covered yet in the academic literature. The main goal of this research is thus to investigate the most effective and innovative methods used by freelance translators to attract and acquire new clients. This paper is of particular interest because it studies a topic of high interest, which is client acquisition strategies implemented by freelance professionals, and it presents the results of a survey that was carried out for the first time among freelance professional translators, with the aim to fill the scientific gap observed in Greek and international literature. The social impact of such a publication, which is the efficient integration of graduate freelance translators into the labour market as well as business growth of existing freelancers and their expansion into foreign markets, should also be mentioned,

Keywords: client-acquisition strategies, language professionals, freelancer, translators, innovation

1. Introduction

Customer acquisition is the process of attracting new customers to our brand. This is usually achieved through marketing activities, and one of the goals is to maintain a steady influx of new customers. This process is almost always costly. While there are many ways to acquire customers, some methods can be more easily identified than others. What we always aim for as professionals is to get as many customers as possible with the minimum amount of work and minimum spending (Chen & Hambrink, 1995). Customer acquisition is the process of attracting new customers to our business. The goal of this process is to create a systematic, sustainable strategy that can evolve with new trends and changes.

The various forms of advertising and marketing are designed to attract people to a product or service in the hope that they will eventually make a purchase. Above-the-line advertising, such as billboards, TV and radio messages, posters, prints and movie spots, are highly effective in displaying the brand in front of millions of eyes, but rarely close a sale or include conversion methods for prospects/potential clients

The process becomes much more informative in online advertising, thanks to the use of technology and the combination of modern and under-the-line advertising. For example, an instant message containing phone numbers or mailing addresses provides an advertising company with data that allows them to identify how many messages have been sent, how many messages have been opened and answered, and how many messages resulted in a sale or conversion.

Customer acquisition has now moved to social media, with Facebook and Twitter (Michaelidou, Siamagka & Christodoulides, 2011) as proven tools for effective visibility. They help to target customers better and send them updates for special offers or new products/services. This way customers acquire value, and there is a possibility to start personal conversations and exchange ideas that develop and evolve the brand (Kaplan and Haenlein, 2010).

The strategy of attracting and acquiring customers to be implemented by a freelance translator is mainly determined by their target market, which is usually divided into two main categories: direct clients and translation agencies.

This paper mainly focuses on the strategies implemented by freelance translators for attracting and acquiring direct clients, as these can be compared to client acquisition practices used by both large companies and SMEs.

The acquisition of agency clients, albeit not minor for the survival and development of a translator, does not entail a complex process of attraction, as it typically only requires sending a CV to a project manager or recruiter, or completing an online form on the translation company's website.

Working with direct clients is, in comparison to working with translation agencies, traditionally more profitable and allows for more flexibility. In addition, it usually increases the quality of life of professional translators, because there is generally less time pressure. Being an integral part of the international marketing strategy of direct customers, translation work becomes very cost-effective, both financially and professionally (JA Jenner & DV Jenner, 2010).

The challenges of working with direct customers are the long and time-consuming process of acquiring customers, and finding time, incentives, and strategy to attract and acquire this type of customer. However, all translators/interpreters can start collaborating with direct customers if they approach the process in an organized and targeted manner, and if they are willing to work hard for it.

Today's translation market is characterized by competition and information overload, so diversifying by gaining a specialisation and expertise and developing a marketing plan, as well as choosing the right client acquisition process and acquisition strategies, becomes necessary.

This paper aims to define the methods used by freelance translators to acquire new clients. The rest of the paper is organized as follows. The next section analyses the methodological framework of this research. The third section discusses the descriptive statistics and the findings, and the final section concludes the paper.

2. Theoretical background

2.1 Customer acquisition process

The acquisition of new customers is a relevant process that consists of many stages, but only a few potential customers can become real customers (D'Haen & Van der Poel, 2013). According to Thomas (2001), the acquisition begins when the consumer interacts with the company for the first time and it continues once the first repeat purchase is made between the service provider and the customer and retention is achieved, until it is terminated. Alternatively, we could consider this process a "sales funnel" (Cooper & Budd, 2007; Patterson, 2007).

2.2 Customer acquisition practices

The rapid expansion of interactive communication channels has led to the increase in the number of potential acquisition practices, e.g., e-mail, call centres, and the Internet (Forrest & Mizerski, 1995). According to Verhoef and Donkers (2005), nowadays acquiring a customer is more complex than in the past due to the specific characteristics of each channel. The following are the most effective practices of acquiring customers (Coughlan, Anderson, Stern, & El-Ansary, 2001): media, direct marketing, internet, referrals. Mass media channels are defined as the channels used to reach a wide audience. Television, radio, newspapers and magazines are some of the acquisition methods that can be used, as well as direct marketing. The latter is very common, and it involves direct mail and telemarketing (Verhoef & Donkers, 2005). According to La Stone and Wyman (1994), telemarketing is ideal if the aim is to achieve a beneficial relationship between the customer and the company. Internet serves as a tool as far as e-mails and websites are concerned. Through personal selling we can reach only a small number of prospects. Typically, door-to-door sales and network sales are part of personal selling (Verhoef & Donkers, 2005). Concerning word of mouth or customer referrals, they constitute a particular customer acquisition channel, as existing customers can attract new customers to the company, by informing their network of friends, relatives, or associates (Verhoef & Donkers, 2005).

Apart from the aforementioned practices, customers can also be attracted via social media and add them to this list (Michaelidou, Siamagka & Christodoulides, 2011). According to Kaplan and Haenlein (2010), social media is "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of user-generated content". Social Media can be divided into many

categories, like blogs, social networking sites (e.g. Facebook & Instagram), content communities (e.g. YouTube), and virtual social environments (Kaplan & Haenlein, 2010). As a consequence, transactional marketing and relationship marketing are not considered conflicting (see Coviello et al., 2002). As Coviello et al. (2002) and Fruchter and Sigué (2005) stated, it is of high importance to be able to examine at the same time transactional and relationship practices, in order to decide (a) the marketing logic that firms prefer (as manifested in marketing practice) and (b) the way the different practices have an impact on the company's performance.

2.3 SMEs: Freelance linguists case study

As Hambrick, MacMillan & Day (1982) and Woo & Cooper (1982) stated, every enterprise, independently of its size, needs to follow its own strategy to be successful. As business strategy requires acquiring new customers, research carried out by Hambrick et al. (1982) and Woo & Cooper (1982) shows that small enterprises have a different customer acquisition strategy if compared to their large counterparts. SMEs and large enterprises have a distinct difference: SMEs do not possess the resources that large enterprises have (Singh, 1990). According to Chen and Hambrick (1995), existing resources serve as help for companies when competing with other companies, and they represent the main obstacle SMEs and consequently freelance professionals face as far as the customer acquisition process is concerned. In other words, how SMEs and freelancers should react in terms of expansion of their customer base remains a grey area, since the existing literature attributes customer acquisition practices to large enterprises only. It is the target market that defines the customer attraction and acquisition strategy that freelance translators/interpreters need to follow each time. The target market of professional translators can usually be split into two main categories: direct clients and translation companies. In a deeper analysis, target markets can be determined based on geographical criteria, since the local market would require a different marketing strategy compared to the international market.

3. Methodology

3.1 Research objective

The goal of this research was to bring together the client acquisition methods, techniques and strategies that freelance translators use. Therefore, the main question that this research aims to answer can be formulated as follows:

What are the most effective methods used by freelance translators (and, in general, representatives of the language professions) to attract and acquire new customers, since freelancers do not have the same resources and resources that large and/or small and medium-sized enterprises have?

3.2 Qualitative research

Since little is known about acquiring clients in the language professions and the translation industry, a descriptive exploratory survey was chosen.

A qualitative approach is an exploratory method. Exploratory study is conducted to bring new knowledge into a field of research.

3.3 Case selection and sampling

In the limited timeframe of the research for the MBA Thesis 80 questionnaires were sent out of which 62 were answered, so a response rate of 77.5% was achieved.

The aim was to collect as many and different as possible original methods of attracting and acquiring clients in the language professions, and more specifically among translators, interpreters, trainers, linguists, editors, proofreaders, copywriters, and others. The questions were mostly open-ended, short answer.

In total, 27 fields were asked to be filled in.

As we are going to see in more detail below, the first part of the survey consisted of 12 fields, 6 of which were open-ended questions with short answers, while the other 6 were closed-ended questions with multiple choice answers, with the possibility of adding an open answer in the "Other" option at the end of each question. The

second part consisted of 15 fields with 2 closed-ended multiple choice questions with the option to add an open answer by filling the "Other" field at the end of each question.

Questionnaire

The questionnaire included a First Part with demographic questions, such as Professional title, Country of residence, Education, Target Market (with geographic criteria), Professional status, Years of professional experience, Specialisation, Target Market (B2B, B2C, Public).

The Second Part included questions such as:

- Q1: How did you acquire your first client?
- Q2: What is your preferred and most result-oriented way of attracting new clients?
- Q3: Mention a piece of advice you follow to rebound and find a new client.
- Q4: Which platforms do you use to find potential customers? Do you have a preferred one?
- Q5: How do you turn prospects into actual customers?
- Q6: What strategy of yours is the most effective to turn leads into customers?
- Q7: The majority of your clients (70-100%) resulted/came from…
- Q8: Please share if you use a strategic method/approach and in case you do, please let us know which one
- Q9: Did you ever attend any course to enrich your knowledge about client acquisition, business development, etc.?

4. Findings

4.1 Descriptive statistics

As it is readily apparent from the diagram below, there was a variety of different respondents to ensure the dispersion of the sample. More specifically, it is clear from the diagram that respondents came from 15 different countries in Europe, North America, Latin America and the Middle East.

The following countries appear at a more frequent rate in a random sample: United Kingdom, Netherlands, Portugal, Italy, Germany, Poland, Romania, Spain, France, Greece, Hungary, USA, Argentina, Brazil, Israel.

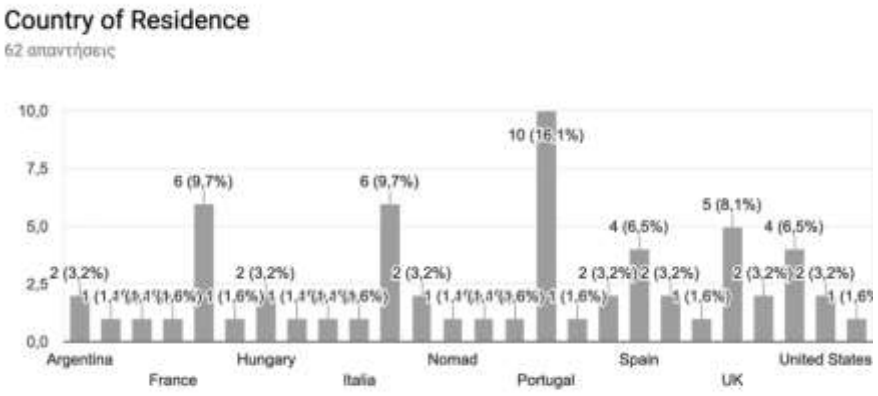

Figure 1: Country of residence of respondents

In the section “Your clients come from…”, the statistics are clearly more distinct, where almost 60% of the respondents said they are addressing the international market, i.e. all continents.

This is followed by 55% targeting the European market, which is not surprising as most respondents were based in a European country.

40% are targeting the national market, the market in the country where they are based.

35% target the local market and 22.6% target the US market.

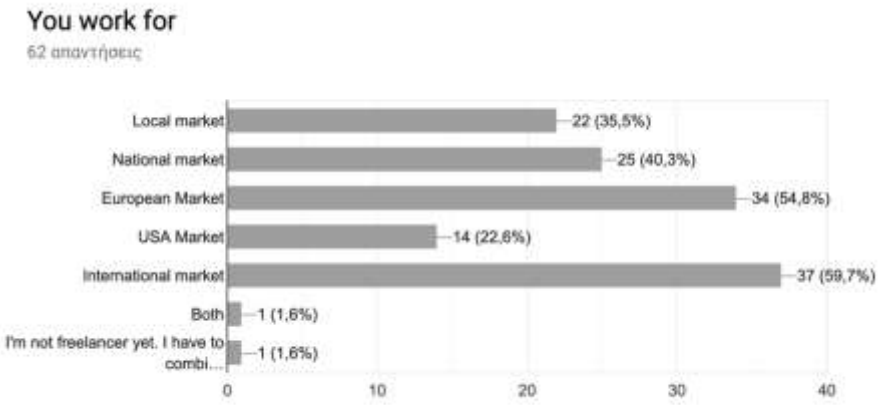

Figure 2: Target group of respondents

In the Section concerned with the professional status of respondents, the statistical data is not that discernible, as most respondents chose to fill in the "Other" field, resulting in no distinct statistical data, although standard answers were given (translator, interpreter, or business owner).

69.4% of the sample consisted of professional translators.

The remaining 30% was composed of a combination of the above answers or all three professional translators / interpreters / owners of a translation company, etc.

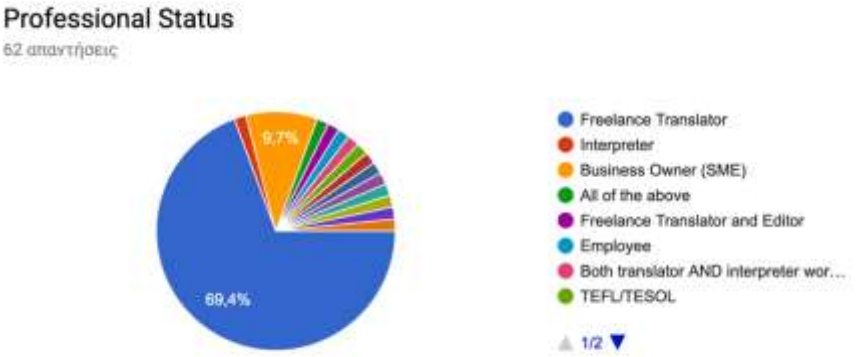

Figure 3: Professional status of respondents

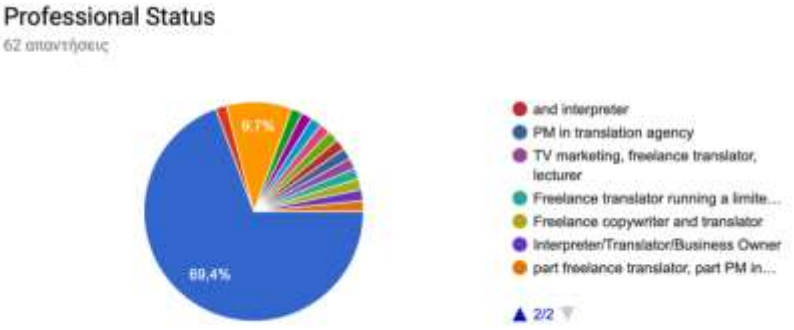

Figure 4: Professional status of respondents - part B

In the Section concerning the years of experience of respondents, the statistics are very distinct.

42% of respondents had 10-20 years of experience, so this is a particularly experienced sample.

This is followed by 24% with over 20 years of experience, which was the highest value available in the response field.

22.6% of the sample had 5-10 years of experience.

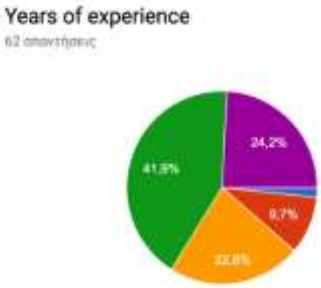

Figure 5: Years of professional experience of respondents

In the Section regarding the specialisation of the respondents, the fact that more than half of the sample (51.6%) was specialized in the translation of marketing texts is considered very important for this study.

As this number demonstrates the respondents' knowledge of basic marketing principles as a result of their expertise, it is understood that they would apply such principles to their own business and consequently understand how much they could offer to this research and study.

About 42% of respondents stated they were specialized in business texts.

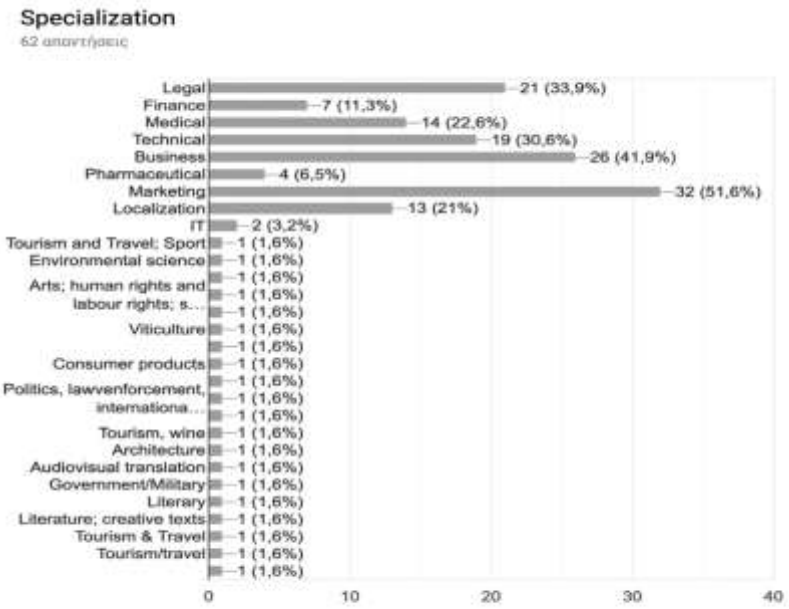

Figure 6: Specialisation of respondents

In the Section concerned with the respondents' main clients, the interest is concentrated on the two most selected answers.

77.4% of respondents said they target translation companies and 59.7% target direct customers.

When it comes to client acquisition for language professionals, it is important to note that one option does not exclude the other, i.e. a professional translator can work with both translation companies and direct clients.

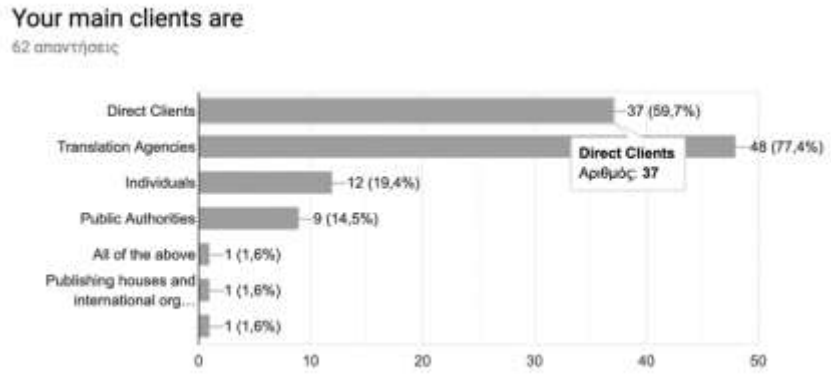

Figure 7: Main customers of respondents

In the Section referring to the most effective client acquisition method, 39 respondents out of 62 respondents stated that 70-100% of their clients are the result of personal recommendations.

37 said that 70-100% of their clients are the result of word of mouth.

29 said they are a result of networking.

16 said they are a result of social media.

12 said they are a result of online research.

9 said they are a result of an email marketing strategy.

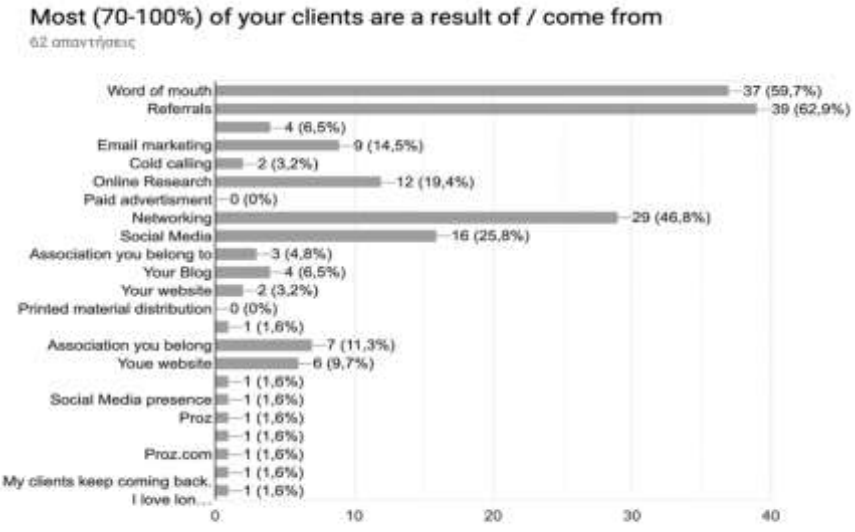

Figure 8: Client acquisition method that most clients are a result of.

4.2 Outcomes of qualitative research

Through the first question of the qualitative part of the survey (How did you find your first customer?), 22 different ways that freelance translators use to attract and acquire their first customer were collected.

Among other answers, the following were collected: a former employer (a common answer to the above question), a direct e-mail approach to translation companies, recommendation from former colleagues (regardless of industry), friends, through an online translator directory, through online platforms, the family environment. Regarding recommendations from fellow translators, it is particularly interesting to note that in the translation industry, unlike most professions, a large percentage of new clients or projects come from other colleagues who either do not work in a given language combination or do not have the time or skills needed for the execution of a specific project.

In relation to applying to work for a translation company, several respondents mentioned that they found their first client by applying for the position of professional subtitler/translator in a company while they were still students. The translation company they worked as in-house translators is one of the most common answers to the above question. Internship in a translation agency may be the first job of a translator before becoming a professional. Other answers included: a former professor, personal contact with the public service translation manager e.g. Court, through a freelancing website, through a database of translation companies on translation associations websites.

Attracting and acquiring clients as a professional translator is completely different when entering the job market, since some of the most effective methods of attracting and acquiring clients are not feasible in practice, such as reputation building through recommendations (word of mouth), because they demand experience and several years in the translation industry to get results. Besides the abovementioned, we should not forget to mention the following techniques and strategies for attracting and gaining customers should be mentioned: networking, blogging, inbound marketing, and website maintenance. Nevertheless, these techniques take time and long-term implementation to bring the desired results, therefore are not usually selected during the first months in the industry.

Moreover, in the second field of the second part of the research, participants were asked what their favourite or most effective method of attracting and acquiring customers was. This question differs from the one in the previous section, which was concerned with the way respondents acquired 70-100% of their customers: on one hand, this is not a closed-ended question and it does not present multiple choice answers; on the other hand, it asked respondents for their opinion on which method of attracting and acquiring clients they considered the most effective or their preferred one, whether because it brings them the most clients with the least effort or because they just enjoy the process.

In the third field of the second part of the survey, participants recorded how they cope with a period of inactivity and acquire a new client. 35 practical tips/methods used by professional translators to escape from a period of inactivity and to attract-acquire a new customer were recorded.

Some of the respondents answered that they do not have any method in place; however, some answered that they constantly look for new customers on the internet in order to update their customer base. Others answered that they do not have a method that immediately delivers the desired results, as it usually takes time for efforts and marketing moves to pay off.

A personalized e-mail to translation companies is one of the answers collected; the truth is that according to statistics in general, the flow of translation projects from translation companies is much higher and more frequent. As a consequence, even professional translators who work mainly with direct clients use this method to get out of a period of inactivity and inaction by contacting a translation company they have collaborated with in the past or that is looking for translators with their language combination and specialization, or one they have been recommended to.

Immediate response to e-mails and contributing to translation forums by offering advice and help to other colleagues are cited as methods to gain clients.

Recommendations among colleagues, networking and participation in business meetings are also mentioned as means to gain new customers. It is interesting to note that participation in training workshops and seminars is also presented as a method for gaining customers. For the first time in the findings of this research, the concept of USP (unique selling proposition) was found as a method of getting out of a slump; it is recommended to adapt it to the customer's needs, whether it is the adequacy of a native speaker in a foreign language, or specialization

in a demanding field such as medical translation, or even team spirit or the ability to work in a team to accomplish major projects.

Recorded responses include: communication with companies with which they have worked before or with which they have exchanged information but the opportunity to work has not arisen. Communication with translation companies found after an internet research. Networking and participation in conferences was projected as a method of immediate recoup; in fact, it is recommended to create a specific plan for participation in professional conferences and exhibitions or professional meetings. Participation in events in the field of specialization of the translator. Finding a field of specialization that is not saturated to face the competition is of course a long-term tactic that requires training. On the contrary, searching for job postings or translation job offers on online platforms is a tactic with immediate results. Other answers included: immediate response to a client's request and treating potential clients pleasantly and politely, as well as following-up with a call, e-mail, or a Skype chat. Visiting and participating in trade fairs mainly concerns the attraction and acquisition of direct customers. Through public speaking at conferences. Asking for referrals from existing customers.

13 replies were recorded to the fourth question of the second part of the survey, "Where do you find potential customers? Some favourite platforms?". Platform Proz & its BlueBoard, LinkedIn, Smartcat and Payment Practices were cited by most participants, with LinkedIn being referred to as the best platform for finding prospects/potential direct clients, while the other three only for finding translation companies. Translation association networks were also mentioned, as well as various social networks such as Facebook, Twitter, and the internet in general. Other answers included: industry conferences, trade fairs, recommendations from clients and colleagues, local networking events, events organised by law associations (for translators working with law firms), professional events in the translator's target industry, and international events and conferences in the field of translation specialisation.

Social networking events were cited several times as the preferred strategy and are considered more effective than online platforms. According to respondents of this research, professional translators prefer in-person communication over any online platform.

For the fifth question of the second part of the research, participants were asked how they turn potential customers into paid ones, which is a continuation of the previous question.

Many respondents did not answer at all; from those who answered the question, 32 results on how to turn prospects/potential customers into paid customers were collected. The different way respondents approached the question and formulated their answers is also interesting to note.

The sixth field and last of the second part of the research, aimed to go a little deeper into the previous question and asked participants whether they used a specific strategy for the same process of converting prospects/potential clients into paid customers ("What is your most effective strategy to convert leads into customers?"). 23 people out of 62 respondents stated that they did not have a strategy or did not provide an answer. But 33 very interesting responses were recorded. Some of the answers include the following: pricing and delivery time within reasonable limits, fast response, suggesting an in-person meeting, communication via email or phone and sending a custom quote, highlighting relevant experience and similar clients for whom they work, professionalism, frequent communication. Other answers include: offering quality in combination with meeting the needs of the client; creating valuable content that potential clients will see on an ongoing basis (content marketing); emphasising on follow-up, highlighting the benefits that translation services bring to the prospect; offering a solution and developing communication/relationship; developing a personal relationship rather than direct selling from the beginning; being friendly; highlighting translation mistakes in a potential client's published material, e.g. their website; asking the right questions to the prospect, proving the translator's knowledge of the subject; active listening to customer's needs; mixed e-mail marketing; LinkedIn and peer recommendations; and maintaining regular communication by telephone, email or in-person meetings.

5. Conclusions

In conclusion, this study has recorded 162 different methods that freelance translators use to attract new clients.

Freelance translators who filled in the questionnaire explained their strategy for acquiring clients.

The effectiveness of these practices is judged by the result of attracting and acquiring customers.

However, as mentioned above, it was observed that respondents had a different view of what methods they considered effective. The most effective customer acquisition practice recorded was recommendations and word of mouth, followed by attending and visiting professional events, and networking.

Events and social networks were found to be the next most effective means of acquiring clients. Proz and LinkedIn were recorded as the most effective online platforms. LinkedIn is mainly used to expand one's professional network by adding new contacts. This practice is often used as the next step (follow-up) in the customer acquisition process after visiting an event. However, this practice is also used as a standalone way of contacting potential customers, highlighting the services offered by the professional translator and how they can be useful to the customer. Blogging and having a general online presence were also recorded as effective practices. Writing professional blogs on topics related to the target market is a way to promote knowledge on the subject. These blogs are shown on their own or as a part on a professional website to reach a wider audience. The next step taken by professional translators is to republish the articles on different social media channels.

However, investing in paid advertisements, distributing printed material, or using traditional media are completely absent from the results of this research.

Instead, several methods used by professional translators, such as specific translation platforms, colleague recommendations, industry conferences, and personalised online profiles were reported in order to fill the gap of direct sales used by large companies. Digital marketing was not found in the results, though there was mention of inbound marketing, which may indicate the lack of relevant knowledge among translators, as well as a general lack of targeted, conscious strategy. Also, unlike SMEs, methods such as conducting seminars and webinars, and the combination of training and coaching as ways of acquiring clients may be at an early stage in the translation sector; the combination of training and coaching as a method for attracting clients, although public speaking was recorded.

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Ensuring Innovative Development of Enterprises in the Context of Reduced Government Support

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Abstract: Innovative development supposes significant positive changes in the economic system's qualitative state, which are provided by a constant growth of innovations in various types of technical parameters. Solving this problem requires a significant amount of resources, including recourses from public sector. These resources are aimed at ensuring the progressive growth of investment in fixed assets, financing of fundamental research and applied development, investment in human capital and its development, taking into account constantly changing needs. In the conditions of Russia, state support for innovative development inevitably runs into restrictions associated with the crisis provision of financial resources, aggravated by the consequences of the current coronavirus crisis. The purpose of our study was to develop theoretical principles for the formation of an innovative development model as close as possible to the conditions of private sector self-financing, by searching for growth sources in innovative activity inherent in the market mechanism itself. The research's scientific basis are fundamental provisions of the economic theory and approaches in the field of innovation management and innovation process. Distribution of cloud-based business concepts determines the realization of interactive model, in which the innovation process has a complex nonlinear structure, and the economy is acquiring as a global innovative character. The conditions for the functioning of the interactive model determine the progressively increasing level of innovation activity due to the opportunity to become participants in the innovation process for business systems with an insignificant amount of physical resources. Another factor to be called is the emergence of an incentive to innovate large structures as a result of the weakening of their monopoly position as a result of the development of innovations. The last factor will be the short-term nature of innovation rent due to the accelerated diffusion of innovation in an open model, which forces enterprises to implement and introduce new developments at a faster pace. As a result, we have developed a model of self-replicating growth of innovation activity of enterprises in the context of an interactive innovation process. The analysis of the sources of growth of innovative activity inherent in the market mechanism showed that the triggers of the self-replicating growth of innovative activity of enterprises are the development of info communication technologies in the direction of digitalization and the formation of an open network-centric business model determined by it. The implementation of this model ensures innovative development in conditions of a significant decrease in the requirements for the volume of its state support, but does not completely exclude it. The proposed model implies redirecting efforts of the government, first, to support the development of the digital economy, and, secondly, to improve the quality of the institutional environment of cloud-based systems and high-tech businesses.

Keywords: innovative development, an interactive model of innovation, governmental support, self-replicating growth

1. Introduction

A model of entrepreneurship at any level relevant to modern conditions is associated with the implementation of innovative activities. This model assumes a transition from the concept of growth to the concept of development, largely based on positive qualitative shifts due to a constant stream of innovations, technological progress and the production of products with high added value. Development based on innovations is associated with the level of innovative potential of the economic system, defined as a combination of opportunities (internal and external factors) that, if implemented, provide the indicated significant positive changes in the qualitative state of the economic system. The implementation of innovative potential is carried out through the implementation of innovative projects and programs, which imply a completely different level of investment than projects without an innovative component. In other words, entrepreneurial activity related to innovation requires a significant amount of resources, including from sources of the public sector, aimed at ensuring the progressive growth of investment in fixed assets, financing of fundamental research and applied development, investment in human capital and its development, taking into account ever-changing needs.

Another factor to consider is a problem of the accumulation and implementation of innovative potential, which is especially relevant for Russia, is the selection of the main participants in the innovation process (business,

universities and the state), as well as the establishment of a mechanism for their interaction. Currently, many researchers are of the opinion that, from an institutional point of view, a necessary condition for building a national innovation system is following the principles of the Triple Helix Model [Itskovich, 2010]. A feature of this model is, among other things, an orientation towards weakening the regulatory role of the state in the system. As well as its shift towards the functions of providing direct and indirect support at all stages and all participants of the innovation process, in order to maintain its flexibility, as well as ensure the effectiveness of the innovation system as a whole. At the same time, the progressive development of innovative activity, as a rule, is associated with vital state efforts in supporting this direction. At the same time, in the conditions of Russia, state support for innovative development inevitably runs into restrictions associated with the unstable provision of financial resources, aggravated by the consequences of the current coronavirus crisis.

Thus, the purpose of our study was to develop theoretical principles for the formation of a model of innovative development as close as possible to the conditions of self-financing of the private sector, by searching for sources of growth in innovative activity inherent in the market mechanism itself. To achieve this goal, the following tasks were solved:

- to clarify the concept of innovative development of the economic system;
- to analyze the directions of state support for innovative development existing in Russia and the achieved development results;
- to identify market sources and conditions for the growth of innovative activity;
- to propose optimization approaches to the establishment of the level of innovative activity in the context of a reduction in state support.

2. Literature review

The basic concept of "innovation" is quite multifaceted, characterizing both the process of mastering innovations (innovations, that is, the results of scientific research and experimental design developments) and the product of their implementation. In the article, we mainly rely on the most general approach to understanding innovation, considering it as the final result of the process of introducing innovations into the economic activity of a separate economic system, which significantly positively affects the performance indicators of this system (Schumpeter, 2007). For research purposes, we differentiate innovations by the type of technical parameters into product and process ones (technological; managerial; innovations associated with transformations of the structure and types of markets). Also important is the classification depending on the level of novelty, in which we adhere to the following structure:

- epoch-making innovations (occurring once in several centuries, determine the transition to a new economic era);
- basic innovations (realize the potential of epoch-making and determine the transition to a new technological order, the change of the Kondratieff cycle, global transformations in other social spheres);
- improving innovations (develop the potential of basic ones, but are associated with less significant changes and have a shorter life cycle);
- pseudo-innovations (minor technical or external changes). (Rodionov 2017, Rudskaia 2017)

The subjects of innovation activity are also not homogeneous and can be differentiated into innovators, that is, subjects creating innovations (R&D stages, pre-seed and seed) and innovators, that is, subjects who master and implement these innovations (the final stage of the seed stage, and (See also the startup, early stage and expansion stages). At the same time, innovators can also be classified according to the stage of joining the innovation process into three groups: early receivers (joining at the seed stage), early majority (joining at the mature start up and early stages), and majority (joining at the expansion stage). In the context of applying this classification, the diffusion of innovations is defined as an exponential growth in the number of innovators in the subgroup of the majority (Schumpeter, 2007, Bracio & Szarucki 2020, Lebedev 2018).

2.1 Directions and results of state support

In world practice, such forms of state support as financial (direct and indirect), informational, advisory, educational and infrastructural support are being implemented. At the federal level in Russia, state support for innovative activities is regulated based on the Federal Law "On Science and State Scientific and Technical Policy".

This Law includes, among other things, such areas as the provision of benefits for the payment of taxes, fees, customs payments; provision of information and advisory support; the formation of demand for innovative products; financial security; provision of infrastructure, etc. (Babkin et.al 2020, Rodionov et. Al 2020))

The assessment of the actual level of state support in Russia, as well as the results of its implementation in these areas was carried out based on an analysis of the data of Russian official statistic. The analytical report of the Institute for Statistical Studies and Economics of Knowledge of the Higher School of Economics (HSE) (2020), as well as the results of the Global innovation Index (2020).

2.2 Market sources and conditions for the innovative activity growth

When establishing the target function of enterprise development (including innovative development) to determine the vector of favorable directions, we adhere to the position of maximizing the current cost of capital (enterprise value). The key internal fact of the increase in value is the receipt of a positive economic profit, which, in fact, is a rent or quasi-rent that enterprises receive due to monopoly ownership of some type of resource (material or intangible).

The modern innovation research methodology distinguishes push and pull models of a linear innovation process. Within the push model, the driver of innovation is fundamental and applied research and development, and within the pull model, the needs of the market. The linear process is a sequential phase change: the pre-R&D phase, the prototyping phase and the commercialization phase, including the R&D stages, pre-seed, seed, start up, early stage and expansion. Within the framework of the R&D and prototyping phases, the prerequisites for the formation of innovative rent are created. That is realized in the second phase and subsequently distributed among the participants in the innovation process (innovators and innovators).
The bottlenecks of the linear innovation process are the weak interconnection of stages, the absence of feedbacks, and low correlation with the distant external environment (that is, the development trends of the world and national economy, society, environmental requirements). A critical disadvantage from the point of view of the requirements for the volume of resources is their inefficient consumption (binding), since the volumes of ownership are determined taking into account one-time peak loads (Kvasha et al., 2018). For example, the results of the functioning of corporate research departments (inventions, developments, knowledge, etc.), firstly, cannot always be fully implemented at a separate enterprise, and, secondly, they are often repeated by several research laboratories.

The linear model of the innovation process corresponds to the local level of industrial automation, which provides a proprietary control system, that is, incompatible between enterprises. The principle of closeness determines the proliferation of centralized (platform-centric) business models (Rifkin, 2014). The development of information technology has led to the digitalization of the economy, which leads to the formation of open (cloud) management systems and determines the development of network-centric business models that go beyond the boundaries of one enterprise. The technological basis for the transition to a new economic paradigm is cyber-physical systems, the Internet of Things and cloud computing. It is planned to switch to fully automated digital production controlled by intelligent systems in real time in constant interaction with the external environment, going beyond the boundaries of one enterprise, with the prospect of uniting into a global industrial network of things and services (Bodrunov et al., 2018). In other words, cloud business models have a distributed structure that allows remote resources to be combined into a single additive and flexible stock, which makes it possible to access the required amount of resource at a certain time (Kvasha et al., 2018). In turn, the proliferation of cloud systems determines the implementation of an interactive nonlinear innovation process. Distinctive characteristics of the nonlinear model are the strengthening of the correlation with the external environment, as well as the fact that new ideas can arise and develop at all stages of the innovation process, and different stages are connected by feedback loops. This provides a reduction in the duration of the entire innovation process due to the possibility of parallel implementation of stages, as well as the commercialization of various forms of research results at all stages of the innovation process.

3. Materials and methods

The scientific basis of the research is the fundamental provisions of economic theory, approaches in the field of innovation and innovation process management, basic models of innovation research methodology. Considering innovative development, most researchers use this concept without specifying the essence of the term, assuming the immanence of the meaning. Others (for example, Bezusenko (2016); Lyutoeva et al. (2018)

preliminarily introduce a concept for the purpose of unambiguous approaches to its interpretation. Development, as a rule, means a transition from one state to another, with is more perfect, that is, positive qualitative changes.

4. Results

In the context of a reduction in state support for innovative development and its implementation on a self-financing basis, the consumer becomes a source of resources, regardless of the specific forms of attracting financing. For example, when considering improving product innovations (as the most massive type of innovative activity of innovative enterprises in the subgroups of the early majority and majority), the consumer, in fact, pays an imputed "tax" in the form of an increase in prices for improved products (goods, works, services) compared to with already produced analogue products (Demidenko et al., 2020).

According to Fisher's equation, the value of the money supply corresponds to the value of all products (as the product of prices and quantities) (1):

$$\alpha * M = P_t * Y\ , \qquad (1)$$

P_t – Price level;
Y – Product quantity;
α – Money turnover (taken as constant);
M – Amount of money in economy.

The main elements of the "producer-consumer" system in the context of the innovative development of an enterprise-innovator from the subgroups of the early majority or majority, as well as their interrelationships, taken as a basis for solving the problem, are shown in Figure 1.

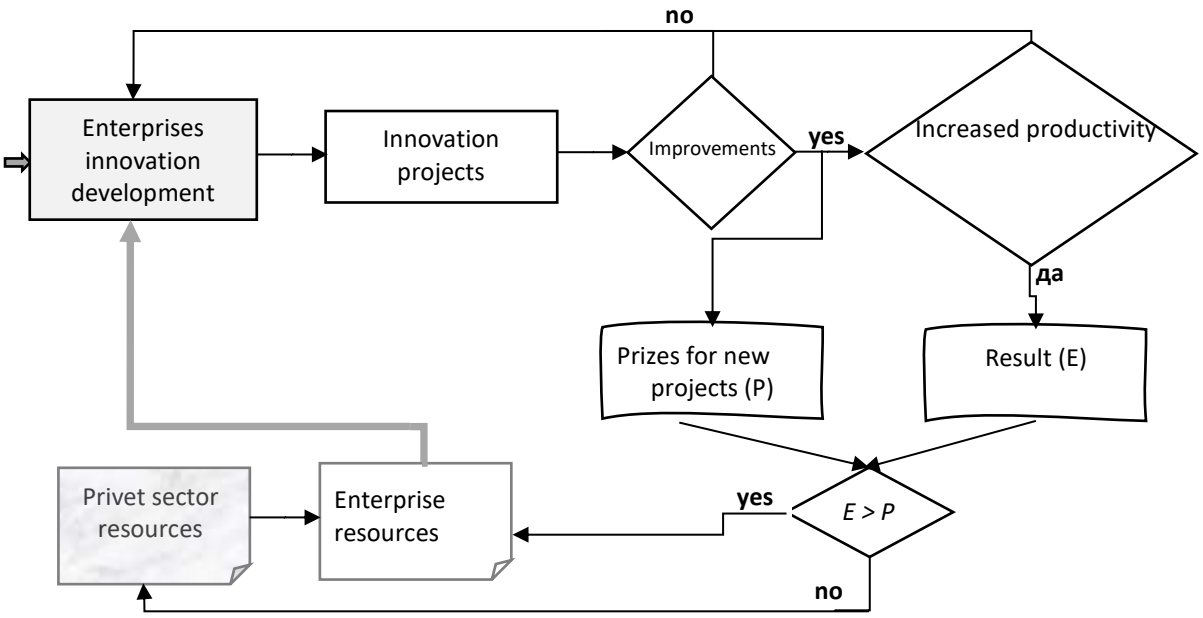

Figure 1: Model of innovative development of an enterprise-innovator of a subgroup of the early majority or majority with elements of the "producer-consumer" system

Based on the generalization of the basic concepts available in the theory of innovation management, as well as the concept of "development", a strict definition of the term "innovative development of an enterprise" has been formulated. The innovative development of an enterprise should be understood as a process of significant positive changes in the target criterion of the innovative enterprise activity. Through maintaining a regular flow of innovations of various types of technical parameters (effective use and reproduction of innovative potential), which presupposes a high level of investment and the continuity of the implementation of innovation and investment projects.

The correspondence of the provisions of federal legislation to the forms of support for innovative activities accepted in the world practice has been established.

Financial support (direct) - provision of subsidies, grants, credits, loans, guarantees, contributions to the authorized capital; implementation of targeted programs and subprograms.

Financial support (indirect) - the provision of benefits for the payment of taxes, fees, customs payments; the formation of demand for innovative products; export support.

Consulting support - assistance in the formation of project documentation.

Information and educational support - the provision of information and educational services, respectively.

Infrastructure support - provision and development of infrastructure.

Actual data indicate a reduction in available public resources due to the instability of energy prices, increased social costs, and allocations for the uplift of depressed regions. As a result, for example, the dynamics of spending on science is characterized by a negative trend. The share of scientific expenditures in GDP in 2019 amounted to 1.03% versus 1.13% in the baseline 2010. For comparison, in Israel this figure is about 5%, in Sweden, Germany and Japan about 3%, in the USA 2.8%. (Rodionov et. al, 2017, Rudskaia (2017))

The results of Russia's innovative development indicate that Russia's position in 2020 has shifted one point down, to 47th out of 131. In terms of the level of venture capital, the main source of funding for startups, Russia occupies a position close to zero to GDP. There is also a decrease in the innovative activity of industrial production in Russia in all sectors: from 17.8 percent in 2017 to 15.1 percent in 2019.

In an industrial economy, the concentration of production leads to the formation of monopolized markets based on the ownership of significant amounts of physical resources. In these conditions, a significant innovation potential of large enterprises is determined, the incentive for the implementation of which is reduced due to the possibility of obtaining economic profit as a result of price changes. Small enterprises in the markets of monopolistic competition in the industrial economy are not capable of accumulating sufficient innovation potential due to difficult access to resources (Sanneris et al., 2015). The development level of info communication technologies in the digital economy ensures the effectiveness of the interactive model of the innovation process. This model opens up access to innovations for small enterprises that own an insignificant amount of physical resources, which progressively expands the range of potential innovator enterprises that receive the opportunity to form innovative rent due to a temporary monopoly on intellectual capital. When innovations are introduced by a wide range of enterprises, monopoly markets are destroyed due to the formation of markets for monopolistic competition for substitute products. This leads to the emergence of incentives for innovative development for large enterprises to ensure the replacement of monopoly surplus profits for economic profits generated from innovation rent. In addition, an open (interactive) model of the innovation process, implemented in the context of digitalization of info communication technologies, causes the acceleration of diffusion of innovations, therefore, a reduction in their life cycle, which determines the progressive growth of innovative activity.

As a result, we have developed a model of self-replicating innovative development of the economic system, applicable in the context of redirecting state support in the form of infrastructure support (Figure 2).

Improving product innovations (as the most massive type of innovative activity of innovative enterprises in the subgroups of the early majority and majority) form both economic (E) (through changes in productivity) and financial (P) (through changes in prices and, accordingly, the volume of sources of financial resources) effects for the subjects of the innovation process. For an individual product, the price P reflects the technical capabilities of an enterprise producing an innovative product, while discrete price values are the levels of product improvement. For an innovative enterprise, an important parameter is to ensure that the level of product improvement meets the condition (1). For each level of product improvement, there is an admissible (specified) volume of product output in physical terms, depending on the resource capabilities of the enterprise. The optimization problem in the ratio of the level of improving product innovations to the available money supply is given in (2):

$$M - P_t * Y \rightarrow min$$
$$\alpha * M = P_t * Y \quad (2)$$
$$P_t, Y \in N$$

Application (2) is considered on the example of an individual enterprise. Let P_t = 1,2,3,4,5, M = 9, α = 1. If the enterprise is at level 4 (P_t = 4), then, in accordance with the resource constraint, only output in the amount of two units (Y = 2), which corresponds to the monetary volume of production in the amount of 4 * 2 = 8 monetary units. With a money supply in the amount of 9 monetary units, the financial effect will be 8-9 = -1 monetary unit. The same value is achieved at the second level of product improvement (P_t = 2). At the third level of product improvement (P_t = 3), an output of three units (Y = 3) is achievable, the monetary volume of production is 9 monetary units, and the financial effect is 9-9 = 0. This point corresponds to the minimum deviation from equilibrium conditions (optimum). At higher and lower levels of product improvement, deviations from the money supply will be greater, and accordingly the target function will increase, which is not an optimal solution.

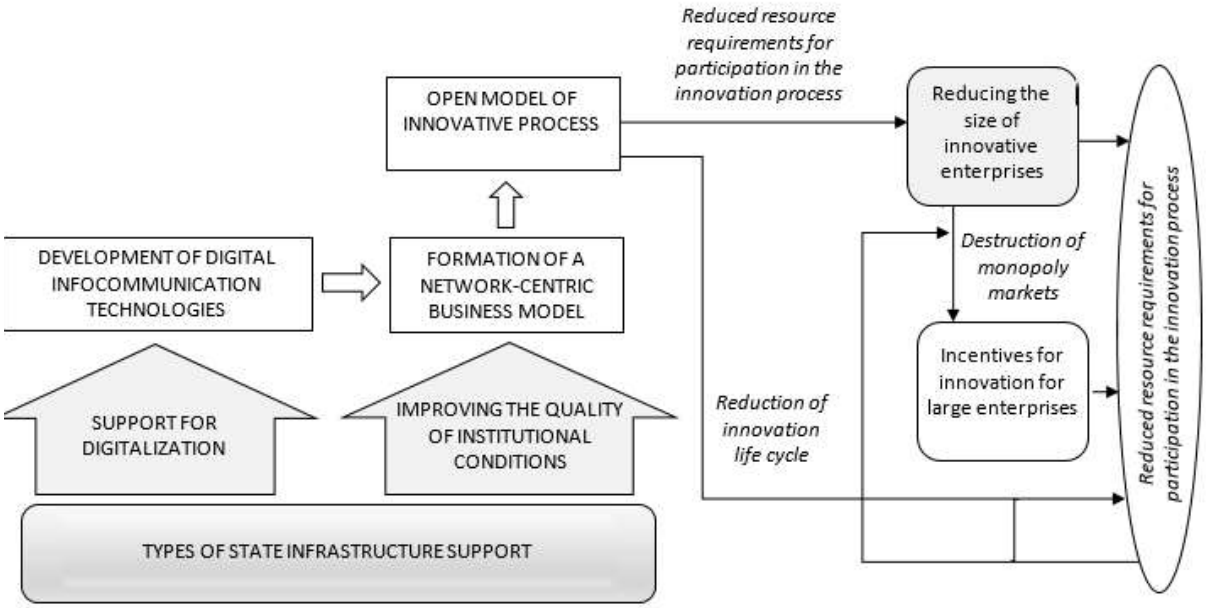

Figure 2: Model of self-replicating innovative development of the economic system in the context of redirecting state support in the form of infrastructure support

5. Discussion

According to the results of the research Global innovation Index (2020), the target indicators of innovation in Russia, set by the government, were not achieved. There is a stagnation of basic indicators of the level of innovative activity, which negatively affects the indicators of labour productivity. Since the provision of the Russian economy with finances is characterized as a crisis, the adopted various programs, strategies and roadmaps remain, which is called “on paper”. The share of spending on science in GDP is declining and analysts predict a further reduction in this area. This state of affairs actualizes the problem of forming a model of innovative development as close as possible to the conditions of self-financing.

Another reason for the low innovativeness of the Russian economy is the insufficient development of competition, weakened by institutional factors and the historical characteristics of domestic industries prone to significant concentration. It is shown that incentives for innovative development of large enterprises are significantly reduced because of the possibility of obtaining economic profit due to the dominant position.

Implementation of the model of self-reproducing innovative development of the economic system ensures the growth of innovative activity in the conditions of a significant decrease in the requirements for the volume of its state support, but not completely excluding it. The proposed model implies the redirection of state efforts in the form of infrastructure support. The proposed areas within this form include support for the digitalization of the

economy, as well as improving the quality of institutional conditions. The analysis of the sources of growth of innovation activity inherent in the market mechanism showed that the triggers of the self-replicating growth of the innovative activity of enterprises are the development of digital info communication technologies and the formation of an open network-centric business model and the development of cloud systems.

The financial effect of the implementation of improving product innovations, as a rule, is expressed in an increase in prices. Consequently, the result of large-scale innovation in the field of improving product innovations is the depreciation of the money supply, since fewer products correspond to a fixed amount of money.

6. Conclusion

The overall effect of the process of innovative development of an enterprise is a combination of economic (characterized by E) and financial (characterized by the ratio of P and E) effects. In a situation where P = E, improving innovation does not raise the price level. As a result, the overall effect of innovative development corresponds to E, which characterizes the most favourable option. It, as a rule, is not achieved, since in conditions close to the situation of self-financing, improving the properties of a product requires an increase in consumer prices to expand the volume of resources. A situation characterized by a decline in prices because of improving innovations is also favourable, but even less probable, since in this case the economic and financial effects take on positive values. The most common is the case of the opposite direction of economic and financial effects. It is also the most difficult, since it requires comparing the magnitude of the economic effect with the additional costs of compensating for price increases. In this case, the outcome, when the economic effect is greater than the financial one, should be analysed additionally. When P> E, innovation generates savings that can be a source of resources for a new stage of innovative development. When P <E, the effect generated by the innovation is insufficient to cover the costs. In this case, additional external support is required. At the same time, the economic result of the innovation process, including losses, is sent to the state budget, which compensates for the losses and allocates the necessary funds for the implementation of the project.

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A Conscious Convergence: Leading Innovation Through Design Thinking

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Abstract: Organisations need to create and sustain cultures that support risk-taking and entrepreneurial behaviour. Corporate Entrepreneurship has continued to gain traction in recent years as a process to develop new business and revenue streams to add value in the marketplace. Successful innovation management has therefore taken centre stage as a strategy to mitigate risk and create competitive advantage. Popularised by global design, innovation and management consultancies like IDEO and McKinsey, Design Thinking has spread its domain of activities into wider fields, where the value of the process is equally important to stimulating the innovation of new products and services. To improve the entrepreneurial capacity of organisations, leadership rooted in Design Thinking has the potential to inspire every employee to act in a creative way and to successfully engage in the process of innovation. This paper, which is both provisional and speculative in nature as it precedes empirical work, discusses how the convergence of conscious leadership and the Design Thinking process can provide the ultimate foundation for creating an improved entrepreneurial culture. It begins by considering the role of convergence before elaborating on a careful selection of published evidence on Corporate Entrepreneurship, Design Thinking and Leadership. We then shift our attention to the importance of Conscious Leadership, as a 'radically new and meaningful paradigm that enhances and enriches everyone who embraces it.' The paper concludes with a set of strategic principles to support organisational environments for entrepreneurial success, emphasising Design Thinking as a tool for sensing and innovating while also providing a foundation for leadership to act as a catalyst for change.

Keywords: design thinking, corporate entrepreneurship, innovation, conscious leadership, convergence

1. Introduction

In the last decade, we have seen the rapid adoption of Design Thinking into a variety of business, management and community practices. In many cases, this has been aimed at increasing innovation and stimulating economic growth at local, regional and national levels. During this same period, we have also seen an increase in the criticism of capitalism and especially the "profit only" motive for economic growth. However, a new business paradigm aimed at increasing "consciousness" seems to be gaining momentum (Kofman 2013; Mackey and Sisodia 2014; Cannon 2016). The integration of more conscious characteristics and behaviours in everyday business endeavours is a challenge for many organisations, as it demands a rethink, shift in mindsets and new ways of working. Organisations need to consider more carefully how to converge different aspect of business activities in order to re-focus and create better integrated systems and processes. We begin this paper by considering the role of convergence as a common occurrence before reviewing and elaborating on a careful selection of published evidence on corporate entrepreneurship, Design Thinking and leadership from the perspective of a convergence of these practices. It is likely that the convergence of these practices will influence what and how leaders select and promote ideas for innovation, thereby yielding competitive advantage in the short term through quick wins whilst inspiring every employee to act in a creative way, to develop and share knowledge, and to successfully engage in the process of innovation in the longer term. We discuss how the new paradigm of "conscious leadership" (Watkins 2014; Mackey, McIntosh and Phipps 2020) and its behaviours and characteristics can converge with Design Thinking principles. A 'conscious convergence' could simply mean a deliberate act of converging but, in this paper, it means this and much more. In particular, it implies an action(s) which entails raising the "stage of consciousness" in the development of organisational environments that encourages entrepreneurial behaviours within the workforce, thereby leading towards more natural and sustainable forms of organisational growth, management and innovation performance. Simply put, the convergence of Design Thinking and conscious leadership can create a better entrepreneurial environment for innovation.

2. On convergence

To 'converge' is simply defined as "to move towards or meet at the same point" and its opposite, to 'diverge' is "to separate and go in different directions" (Collins 2011). For specific situations, these definitions may take on

more sophisticated meanings. The two actions, converge and diverge, often occur as a noticeable sequence and sometimes as a pattern of multiple sequences. They are a common occurrence in everyday life. For example, for decades in 'normal times' school children converge on the local school, usually walking, early in the morning and finally diverge again in the afternoon on their diverse ways home. Now, many arrive on buses, in their parent's cars, on bicycles, scooters and skateboards and nearly all have a "smart phone' in their hands or 'hip pocket'. Humans and technologies are converging everywhere with significant consequences. Children can now stay in contact with their parents at home or even with friends across the world. Information is readily available and education systems change to accommodate the technologies and the science behind them. Behind all of this, the sciences too are converging, prompting the emergence of new sciences (Watson 2016) and the development of new technologies (Schmidt 2008). Companies are also converging in new ways to increase market share through business mergers, acquisitions and strategic partnerships. Similarly, different knowledge disciplines have come together in order to better solve problems and foster new innovations. Design Thinking, for instance, evolved out of the need of large corporations to be more creative when aligning their design, technology and business needs. Indeed, Martins (2009) usefully describes the process as the balancing of "analytical mastery and intuitive originality in a dynamic interplay" (p. 6). The consequences however, of the convergence of several of the failings of modern developments like social inequality, environmental destruction and political instability may even result in the decline of neo-liberalism and what may eventually prove to be a positive change in our social and economic systems (Streeck 2016).

Convergences come in all sizes, so we need to take them seriously. Lifestyles and new businesses arise, flourish and die as a consequence of convergence. How we manage convergences, will not only enhance or destroy our enjoyment of daily life but ultimately improve our chances of building more prosperous and sustainable economic, business and societal models. The success of convergence is particularly important in the context of Corporate Entrepreneurship, where new ideas evolve within an already existing environment.

3. The opportunities and challenges of corporate entrepreneurship

Companies of all sizes face immense pressure to continuously innovate within emerging new global, economic and technological advancements (Kuratko and Morris 2013). Entrepreneurial leadership is hard earned, and it is well-known that most successful innovative companies of our time allocate significant resources to create organisational environments that foster innovative, entrepreneurial mindsets and drive (Hornsby et al. 2009; Kuratko, Ireland and Hornsby 2001; Kuratko, Montagno, and Hornsby 1990; Kuratko, Hornsby and Covin 2014). Corporate entrepreneurship, or Internal Corporate Venturing, i.e., "innovation by established firms" (Baden-Fuller 1995 p. 12), can be the answer to more dynamic and sustainable business growth and performance. It offers opportunities to innovate outside existing core business operations as well as pathways for strategic renewal through new business - not just new products or services (Wolcott and Lippitz 2010). Dealing with risks, ambiguities, and uncertainties that characterise the process of innovation is however intrinsically challenging as it requires agile and opportunistic behaviour, usually attributed to start-ups rather than existing companies riddled with "administrative burdens, bureaucracy, and regulations" (Makarevich 2017, p. 189). Making an old dog learn new tricks appears to be easier than rejuvenating an old established firm through corporate entrepreneurship which requires an organisational culture that encourages entrepreneurial behaviour in the workforce. Points of failure commonly lie in the friction that is caused through the creation, differentiation and convergence of existing and new business units (Burgers and Covin 2016). Clear organisational structures and strong leadership are therefore indispensable. While there are also many other factors influencing successful corporate entrepreneurship, such as availability of resources, talent and market changes, to name a few, "the major thrust behind corporate entrepreneurship is a revitalization of innovation, creativity, and leadership in today's organizations" (Kuratko, Hornsby and Covin 2014, p. 44). It is this correlation of innovation, Design Thinking and leadership that will be examined more closely in this paper.

4. Innovation and leadership

Innovation is essential for the development of human endeavours, an ability to use our intelligence and cognitive ability or adaptive strategies to respond to complex and changing environments. The scholarly literature in the field of innovation is vast and complex, as is the growing body of research on leadership theory. Therefore, this paper will not set out to explore the different strands separately. Within the context of corporate entrepreneurship, however, successful leadership has the potential to grow and maximise innovation capacity while successful innovation in return, can create, improve and influence organisational structures, thereby positively impacting leadership activities (Agbor 2008). Therefore, the convergence between innovation and

leadership is undoubtedly worth examining in more detail due to the interconnectivity and strategic relevance of proactive or reactive responses to change. Definitions and opinions of what constitutes success within leadership and innovation are manifold. Traditional business theory lays emphasis on the bottom line and ascribes success to leadership and innovation that adds value to the company, either through increased profits, growth or improved market position. While this is not to be entirely dismissed as outdated, recent literature has argued that in order to achieve long-term economic success, innovation and leadership should be approached more holistically, given that human capital does not necessarily reach its full potential by being managed according to economic parameters only (Macke and Genari 2018). There is variation in the nature and terms used to describe the characteristics of different holistic leadership approaches, for example, transformational (Bass and Riggio 2006) or responsible (Waldman and Galvin 2008) leadership, and more recently, models around sustainable (Henriksson and Grunewald 2020), ecological (Marin 2013) or conscious leadership (Mackey, McIntosh and Phipps 2020). This paper will briefly discuss differences at a later stage (see section 6.0), however, they are all based on the belief that successful leadership, and subsequently successful innovation, is fostered by the conscious development of positive values and behaviours in the workplace (Marin 2013). Indeed, Marin (2013) points out that "Managers and Leaders have the unique opportunity, given their position of influence, to lead, inspire and grow others" (p. 12), which commonly requires empathy towards those who are being led, such as innovation teams, for example. Similarly, ideation within these innovation teams, is driven by the ability to develop empathy and a deeper understanding of consumer needs and target markets with the aim of delivering effective design solutions (McDonagh and Thomas 2010). Again, this is another form of convergence revealing empathy as a common denominator for successful leadership as well as successful innovation. This is not a coincidence, as both activities revolve around human needs. Handa and Vashisht (2018) point out that "…human needs tend to be complex, rooted deeply in behaviours and attitudes, governed by complex interactions and therefore hard to grapple through a purely analytical approach" (p. 11). In order to build empathy between leaders and innovators as well as end users, convergence might have something useful to offer to companies that value the process of innovation as equally important to the stimulation of new products and services. An increasingly globally recognised and widely applied problem-solving approach with empathy at its core is Design Thinking. It can be defined as "design practice and competence [...] used beyond the design context" (Johansson-Sköldberg, Woodilla and Çetinkaya, 2013, p. 123). Handa and Vashisht (2018) indicate that "All aspects of Design Thinking are applicable to different functional and leadership domains – be it marketing, sales, human resources, or finance" (p. 10). Design Thinking is therefore a practical and essential tool for sensing, simplifying and driving innovation as a strategy for business change (or transformation).

5. The characteristics and behaviours of design thinking

Design Thinking has spread its domain of activities over the past decade into wider fields (e.g. service, public policy and management) as a methodology for creative problem solving with a particular focus on innovation (Brown 2009; Cohen 2014), competitive advantage (Martin 2009), integrating customer experience (Lockwood 2009) and improving decision making (Liedtka 2015). Although many within the design community would argue that the term is now being oversimplified, even misinterpreted, Hobday, Boddington and Grantham (2012) suggest that by adopting the methodology "may lead to a major reorientation of innovation theory, research, and teaching, thereby moving toward a view of the firm as a creative, solutions-generating, social, and flexible organization" (p. 28). While definitions and opinions of Design Thinking vary in the literature, some authors see it as "a unified framework for innovation" (Cohen 2014) others view it as an "essential tool for simplifying and humanising" (Kolko 2015, p.6) and "a mindset, process, and toolbox" (Brenner, Uebernickel and Abrell 2016, p. 7). Lockwood (2009) provides a more overarching definition, capturing the importance of people and process in achieving alignment to business learning and strategizing, saying: "Design Thinking is essentially a human-centered innovation process that emphasizes observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, and concurrent business analysis, which ultimately influences innovation and business strategy. The objective is to involve consumers, designers, and business people in an integrative process, which can be applied to product, service, or even business design" (p. xi). As Design Thinking has grown to full recognition, several pioneers, design agencies and consultancies, have proposed a set of guiding principles and behaviours (Table 1).

The value of a Design Thinking process models (and appropriate design-led methods) to approach creative problem solving is now widely acknowledged in the academic literature. Even a quick Google search reveals a plethora of colourful visualisations and box-and-arrow diagrams that represent any given number of iterative and overlapping steps that aim to generate a set of alternative ideas before prototyping, testing and evaluating

them "against a whole array of requirements and restraints" (Simon 1969). One of the best known and most popular process models is the "Double Diamond" developed by the Design Council in 2005, as a visualisation to describe the design process and to introduce Design Thinking (Ball 2019). It breaks down the design process into four distinct phases, and at each phase, a series of activities are undertaken in order to help manage the risks associated with the design and delivery of new products, services and systems (Figure 1). In the context of this paper, it is interesting to note that the sequence of 'divergence' (i.e., broadening of alternatives) and 'convergence' (i.e. the narrowing down of alternatives) also occurs in the patterns of design problem solving. The Double Diamond Model is in effect a sequence of two 'divergent/convergent' thought patterns and actions. This sequence is probably central to all Design Thinking and to many other problem-solving activities. The Model can be enacted by a single person or by a group (team) acting in unison or by performing different actions within the same overall sequence to make innovation happen. While Design Thinking can be applied to increase acts of creativity in the problem-solving space, exploring it through the lens of making leadership and innovation more valuable through empathy grounded coordination of managerial endeavours, also helps to bring staff together united behind a common agenda (Handa and Vashisht 2018) - a conscious convergence.

Table 1: Five associated behaviours of design thinking (Ball and Docherty 2021)

Behaviours	Outline
1. Questioning –	Whenever addressing systemic (or wicked) problems (Rittel and Webber 1973; and later Buchanan 1992), take a step back, eliminate any assumptions, identify gaps in knowledge and understanding, look at things from a different perspective or through "different eyes" (Baxter and Bruce 2008), define and reframe problems and critically reflect on ideas and opinions.
2. Human Centred –	Design Thinking involves building empathy and engagement "with real people in real environments" who experience the problem (Townson 2017), thereby responding to human needs (Meinel and Leifer 2011).
3. Communicate creatively (visually) –	It is important to build and understand information visually to externally communicate value to stakeholders and customers (Anderson and Lilly 2004) and to promote teamwork through creative activities (Carlgren 2014). Creative visualisation is the cornerstone of good design practice (Liedtka 2004).
4. Co-creation and Collaboration –	It is essential to keep people central to the design process at all times through the use of established models of innovation and design-led approaches (Sanders and Stappers 2008). By designing "with and not for" people will ensure innovative teams are active in responding to human needs, going about projects in the right way, and ultimately working collectively towards new interventions and solutions.
5. Holistic and Iterative –	When practising Design Thinking, take a holistic view across systems (Stickdorn and Schneider 2011) and prototype early and often in recurring loops in order to gain feedback from users and all other relevant stakeholders (Dow, Heddleston and Klemmer 2009).

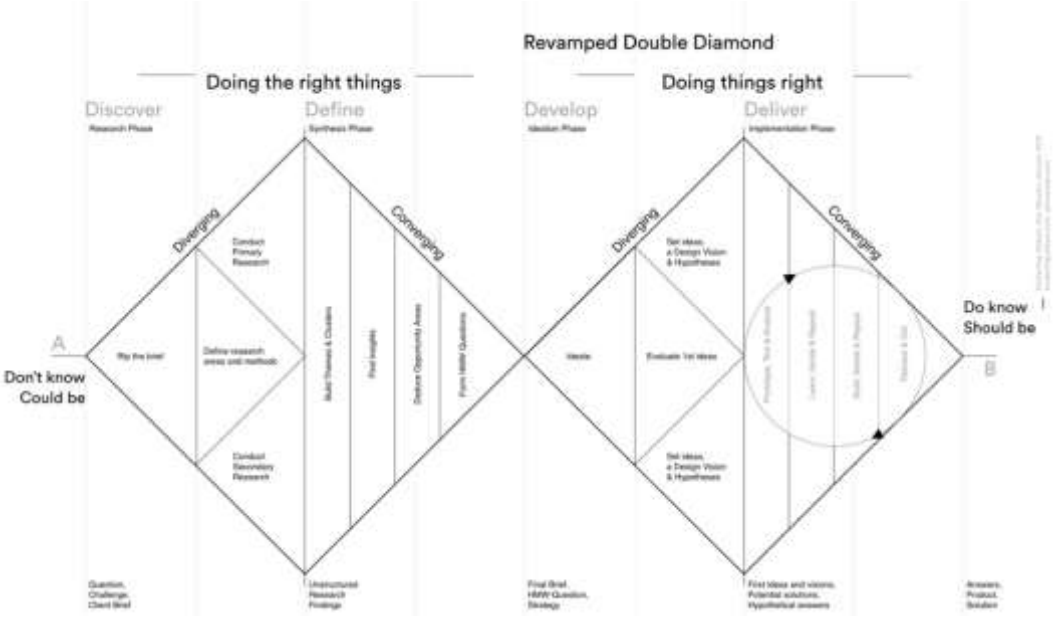

Figure 1: Revamped double diamond design process framework (Nessier 2018)

(Notes: Discover Phase is about questioning and gathering insights through deep user research; Define Phase involves reframing problems and refining the initial design brief; Develop Phase encompasses the activities of prototyping and testing ideas through recurring loops of making, iterating and reflecting; Delivery Phase focusses on the testing and implementation of the final solution.

Applying Design Thinking is about setting the conditions for an organisation to generate, embrace, and execute new ideas (Brown 2009), fostering collaboration, problem-solving and fearless innovation – just what an old firm needs to learn new tricks. However, the implementation of Design Thinking inside organisations often meets its own set of challenges and barriers and it is in this context that conscious leadership can support the process of innovation more successfully.

5.1 Implementing design thinking programmes inside organisations

We believe that Design Thinking is being used extensively in business and community studies and there appears to be a rapidly growing body of research studies, which have used different theoretical perspectives and methodological approaches to examine data from across all types of industry on the implementation of Design Thinking programmes inside organisations. A study to explore the value and effects of implementing Design Thinking processes across large organisations in Germany and USA, found that they were longer term benefits in developing an organisations innovation capability over small term gains like new ideas (Carlgren 2014). The longer-term organisational benefits included, for example, employee competency development and exposure to new processes and new ways of thinking thus leading to improved innovation efforts and more innovative outputs (Ibid). Moreover, the study highlighted the importance of creating an organisational mindset, where there is "a gradual changing of values and norms in the company, instilling value based on building openness, empathy and optimism" (Ibid, p. 414). While the study primarily set out to investigate the benefits of using a Design Thinking process, it also identified organisational challenges around its implementation, such as, the amount of time to learn the Design Thinking process due to conflicting pressures and other work priorities, as well as difficulties in understanding and applying the tools and techniques. In a more recent study across both public and private sectors, Dunne (2018) identified several systemic and cultural organizational challenges when establishing a Design Thinking programme, such as, a lack of leadership understanding and support; prejudices and perceptions held by the rest of the organization on the process; the paradoxical characteristics of organizational efficiency versus the implementation of new ideas; and stakeholder engagement across the whole system. In order to prevent isolation between the Design Thinking programme and the rest of the organisation, Dunne (2018) goes onto suggest 'the need for labs to take, simultaneously, a user perspective ("outside-in," in design vernacular) and an organizational ("inside-out") perspective'. In addition, positing that Design Thinking is more of an exploratory process than an exploitive one, he concludes by saying: "Design programs faced significant cultural barriers. The freewheeling nature of design, with its emphasis on qualitative research, storytelling, and iteration, can be a difficult fit in cultures that prioritize certainty, quantification, and efficiency. While the desire to change culture through design is often real, it is usually (by necessity in hierarchical organizations) driven from the top and may not initially have adequate buy-in at the grassroots; furthermore, cultural change can involve dismantling systems and processes that have built up over many decades, a daunting task for a design program" (Dunne 2018 p.13). It is within this "freewheeling nature of design" where divergent and convergent actions of innovation happen in the Design Thinking process and, where successful leadership is not only crucial for encouraging and supporting those actions by breaking down cultural barriers, but also responsible for creating and enabling positive change. Therefore, immersion into Design Thinking principles and behaviours needs to start at the leadership level to improve the entrepreneurial capacity of the organisation. Indeed, leadership rooted in Design Thinking has the potential to successfully engage all employees in the process of innovation.

6. Towards conscious leadership

Having established that leadership is a prerequisite for improving innovation and the successful application of Design Thinking, a closer examination of what constitutes effective leadership seems pertinent. Stogdill (1974) famously stated "there are almost as many definitions of leadership as there are persons who have attempted to define the concept" (p. 259). In this spirit, leadership can be explored through the examination of behavioural and interaction patterns, character traits, processes, administrational roles, influence and relationship roles, to name a few categories. Starting with Hemphill and Coons (1957) who ground their definition in "the behavior of an individual…directing the activities of a group toward a shared goal" (p. 7), research has evolved and produced a more process-based definition that recognises the fluid components of leadership. For instance, Antonakis

and Day (2018) see leadership as being a "formal or informal contextually rooted and goal-influencing process that occurs between a leader and a follower, groups, of followers or institutions" (p. 5). As there is not a single all-encompassing definition, leadership theory tends to be examined in the context of factors that can affect leadership, for example, different leadership styles or evaluation perspectives. Autocratic, transformational, transactional, situational, democratic or relational leadership styles are a few of the well-known concepts within management and leadership practice. To elaborate on each style would exceed the scope of this paper. However, it is important to acknowledge that leadership is not a one-dimensional, directive activity but rather an interactive process, which can only be effective when it builds collective capacity (Gauthier 2006) through naturally occurring divergent and convergent actions between leaders, their followers and situational and environmental conditions. So, effective leadership will have to demonstrate the ability to not only reactively acknowledge and manage the divergences and convergences, but proactively create and purposefully shape them. Leading change and innovation are immensely difficult challenges for managers within current competitive climates. It involves guiding, encouraging and facilitating collective efforts of members of the organisation to adapt in an uncertain environment and evolve through joint organisational learning (Hannah and Lester 2009). As alluded to previously, Design Thinking is well suited to help with collective problem-solving scenarios, but it will be most effective when underpinned by a leadership style that mirrors its values. In other words, a style that facilitates innovation and aims to contribute value rather than just profit, encourages higher standards of integrity, is rooted in empathy for people within as well as outside the organisation and can continually evolve through conscious and mindful behaviour. Mackey, McIntosh and Phipps (2020) describe conscious leadership as "an inner journey of character development and personal transformation, informed by a powerful understanding of human nature and human culture" (p. xviii). By striving to create better personal and professional life experiences not only for themselves, but also for their employees, conscious leaders can generate better stakeholder buy-in, higher motivation and engagement levels among staff and are therefore able to naturally nurture a sustainable form of organisational growth and innovation. Mackey, McIntosh and Phipps (2020, p. xix) suggest 9 characteristics and behaviours of 'conscious leaders' which they also allocate to 3 clusters (Table 2).

Table 2: Characteristics and behaviours of conscious leaders

Cluster	Characteristics
1. Vision and Virtue	1. Put Purpose First 2. Lead with Love 3. Always Act with Integrity
2. Mindset and Strategy	4. Find Win-Win-Win Solutions 5. Innovate and Create Value 6. Think Long Term
3. People and Culture	7. Constantly Evolve the Team 8. Regularly Revitalize 9. Continually Learn and Grow

Cluster 2 (Mindset and Strategy) is of particular relevance to this paper. Our experiences suggest that the techniques of Design Thinking are highly appropriate for searching for Win-Win-Win Solutions (4) as well as making a contribution to the creation of value through Innovation (5). In addition, the application of the design process as a way to continually diverge and converge in recurring loops around problem identification, idea generation and delivering solutions, allows leaders to take a step back, question things, think differently and co-create with others (Table 1). In doing so, this helps to orientate leaders more naturally towards achieving both short term outputs (or Win-Win-Win Solutions) and setting longer term strategic priorities and direction of the business to succeed in the marketplace (6). Moreover, with empathy and engagement at its core (Table 1), implementing a Design Thinking programme inside an organisation can have a positive impact on promoting and enhancing teamwork whilst at the same time helping to rejuvenate employees through exposure to new processes and new ways of thinking, sensing and acting (7 and 8). As a direct consequence, this ensures that organisations, as complex adaptive ecosystems, continually learn, grow and respond to rapidly changing conditions (9). Although the characteristics and behaviours of conscious leadership are clearly significant in the future success of any organisation, what is particularly noteworthy in the context of this paper, is how the convergence of conscious leadership and the Design Thinking process can provide the ultimate foundation for creating an improved entrepreneurial culture of trust, openness, authenticity and integrity. In other words, while entrepreneurial leadership guides and encourages innovation, often through active teamships in Design Thinking and prototyping, conscious leadership focuses on appropriate innovation embracing all employees, stakeholders, customers and concerns for the Planet and other than human living systems (1, 2 and 3).

7. Conclusion

Having established that innovation is key to successful corporate entrepreneurship, and that innovation is best nurtured through leadership, both elements need to be rooted in empathy to produce positive and sustainable outcomes for the company as well as its workforce. Therefore, Design Thinking with empathy at its core, is the vehicle that can align leadership and innovation endeavours thus creating improved organisational structures for successful corporate entrepreneurship. In our Conclusions to this paper, although many of the listed thoughts are directly relevant to specific issues like leadership, others, are reminders of the important on-going processes which need to be directed at guiding our long-term thinking.

We offer the following thoughts or reminders for future consideration and discussion:

- Everything continuously changes, evolves and flows. Evolutionary flow is the context for all divergent/convergent processes, including communities, innovation teams and organisations.
- Organisations have to learn to embrace convergence in order to live, adapt and flourish in changing situations.
- Organisations need to think more carefully about what and how they innovate. Often the consequences of humanities over-action, intervention and exploitation is to increase complexity beyond our innovative capacity to cope with subsequent emergencies. Innovation is a strategy for adapting to change, sometimes proactively and sometimes reactively.
- Design Thinking is a collaborative and holistic methodology for sensing and has the capability to support innovation through sequences of divergent/convergent thinking and acting.
- Leadership is the focal point or catalyst for the promotion of divergent/convergent actions as an innovative, adaptive response to change. A leader may be an individual, but leadership is a characteristic of the collective.
- Design Thinking by its very nature is an interactive process with empathy at its core and therefore has the potential to build collective capacity when applied at leadership level through naturally occurring divergent and convergent actions.
- Consciousness is a key aspect of growth and has its own evolutionary developmental sequence of divergent/convergent thoughts and actions and complexity. Conscious leadership can develop positive values and behaviours in the workplace.

Therefore, a conscious convergence of the characteristics and behaviours of Design Thinking and conscious leadership can, not only improve innovation in the context of corporate entrepreneurship but is also strategically relevant to enabling proactive and reactive responses to change while fostering a positive organisational environment.

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From Network Approach to Ecosystem Approach: A new Framework for Change Management

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Abstract: The actual change management models drawn from literature are focused only on the perspective of a single organisation. This perspective is not coherent with the new business scenario created by the pervasive use of digital technologies, which requires a new way to deal with organizational change. In particular, organizations have to manage change in a collaborative way, reflecting a progressive shift from a network to an ecosystem approach. Starting from this perspective, this paper aim to present a change on management framework in order to manage innovation within a complex digital ecosystem of actors. Coherently with this goal, the proposed framework will be articulated in a series of phases that have to be considered in the change process within an ecosystem. For each phase, the research will present the most common issues faced by organizations together with the corresponding change management actions. These actions are categorized in short-term and long-term. Moreover, the paper provides a set of indicators that can be used to monitor the effectiveness of the various change management actions. Finally, the validity of the change management framework will be proved thanks to its application in a project of digital innovation in healthcare domain. This analysis will provide a concrete example on how change management can be accomplished throughout a specific digital ecosystem.

Keywords: change management, digital innovation, ecosystem, healthcare logistics

1. Digital innovation: The need to shift from a network towards an ecosystem approach

Any continuous innovation efforts ask for change management (Raza 2017; Rosenbaum 2018), which provides with tools and methodologies to organize, harmonize, monitor and approve all the tasks associated to change (Cameron 2012). The models developed by Lewin (1951) and Kotter (1996) are most solid and acknowledged frameworks to manage change within organisations.

The actual digital transformation enabled the concept of "shared economy", leveraging the inter-company context, instead of the concept of "own economy", developed mainly within an intra-company context (Lianto 2018). For this reason, the organisations start managing processes, such as change management ones, in a collaborative way, enabling the concept of "innovation ecosystem" (Autio 2014; Razavi 2009). This perspective reflects the connection, interdependence and coevolution between different actors and institutions, mainly allowed by the pervasive use of digital technologies.

In this context, the conceptual focus of management is shifting from a network approach towards an ecosystem approach, where the focal set of actors is examined as a part of a broad and interdependent systems environment. For that reason, we can define a digital ecosystem as a co-evolutionary economic system of actors, institutions and technologies, the latter referring to the various types of platforms and technological frameworks shared by all the ecosystem realities (Aarikka-Stenroos 2017).

An ecosystem approach allows therefore the investigation of a new form of change management: focused on the achievement of shared goals and values between different stakeholders of the digital ecosystem (Moore 2013).

2. Change management models: The literature review

Literature point out two main limits of current change management frameworks. First, they are derived from a wide range of elements characterizing change, focusing each model on different aspects (Rosenbaum 2018; Malhotra 2015; Chia 2014). Second, change management frameworks are focused on a single organisation,

without considering the perspective of a whole ecosystem (Cameron 2012; Lianto 2018). In fact, great difficulties in handling an improvement could occur when considering the context of sharing economy, where several organisations collaboratively work on innovation (Razavi 2009). In a digital ecosystem, to manage and control changes, crucial attention must be paid to: the responsiveness to requests for change by all the involved realities; the complexity and scalability of IT shared solutions; the knowledge sharing and the open and constant collaboration between each different organisation and institution (Briscoe 2011; Autio 2014).

For the above-mentioned reasons, the aim of this paper is to define a new framework to manage change within a complex digital ecosystem of different actors. Leveraging on the concept that innovation ecosystems are portrayed by innovation-driven goals (Dattée 2018), this new framework is characterized by a co-evolutionary logic, highlighting the ecosystem-based features of constant dynamism and evolution, as well as the inherent interdependence of all the actors involved (Aarikka-Stenroos 2017).

3. A new framework for change management in digital ecosystems

The new change management framework includes some sequential activation phases aimed at properly guiding the implementation of change within a digital ecosystem.

To define the different phases, we compared the Kotter's phases (Kotter 1996) and Lewis' ones (Lewis 1951), as both models provide the necessary methodologies to create and manage a conducive environment to implement change. As first step, according to the more detailed phases presented by Kotter and thanks to the analogies between the two models, we determined eight activation phases. Then, in order to have a framework more generalizable as possible, we integrated in the framework the Technology Acceptance model – TAM (Venkatesh 2000). In particular, as the TAM reflects the user's acceptance and usage of a digital system, its contribution has been added as a single activation phase called "Promote acceptance of new technology", while the TAM model components were inserted as sub-phases.

Moreover, the new framework wanted to express also the pivotal role of the involvement of management figures (Marble 2003), a concept not explicit in the three-abovementioned literature models. For this reason, a further activation phase called "Top management commitment" was added as the first phase of the framework, underling the importance that continuous presence and support of the management figures have in carrying out the project and in achieving the set goals.

Once the basic structure of the framework is determined, we focused on defining the contents relating to each phase, leveraging the information derived from the abovementioned models in order to focus innovatively on how to manage change at an ecosystem level. First of all, we defined for each activation phase the main limitations that can occur during the implementation of innovation within an ecosystem. In fact, in an ecosystem, limitations can be generally due to the high number of actors and stakeholders directly or indirectly involved in the development of the innovation project and to the difficulty of having a clear communication between them in sharing interests, strategies and knowledge. Then, we described the main change management actions to be adopted by the ecosystem actors, with the aim of overcoming the limitations identified. Finally, common indicators for monitoring the change management activities were also defined for each phase.

The new change management framework is reported below. For each one of the activation phases, the main limitations identified in the ecosystem perspective are provided, together with the corresponding change management actions and related indicators that are necessary to guarantee the correct execution of the model and the consequent success of the innovation project in the digital ecosystem.

3.1 Top management commitment

An innovation project within a complex digital ecosystem of actors can be limited by the poor perception, by the top management figures belonging to the ecosystem, of the common benefit derived by the implementation of the proposed change. In this case, the change management action suggested by our model is to identify one or more top management figures in the ecosystem who can support the proposed change within their organizational contexts (Marble 2003). In order to evaluate the change, we also suggest to monitoring the involvement level of top management.

3.2 Create a sense of urgency

Another limit for an innovation project in a complex digital ecosystem could be the resistance and the lack of perception of the need for change by the ecosystem actors (Autio 2014). In this case, we suggest to managing different meetings with the ecosystem actors in order to promote the need for change and collect their feedback (Kotter 1996) and to monitoring the number of feedback and contributions provided by the ecosystem actors in order to evaluate the impact of the change management action.

3.3 Form a strong coalition

Another limit could be the lack of involvement of the different ecosystem actors (Cameron 2012) and, in this case, the model proposes to encouraging continuous and constant communication between all ecosystem actors involved in the innovation (Kotter 1996) and to monitoring the level of involvement and harmony of the leading coalition.

3.4 Develop a vision

The innovation team could also occur in the failure to identify the common changes and the change management strategy needed by all actors belonging to the ecosystem (Razavi 2009). For that reason, our model suggests to organizing preliminary meetings between the main ecosystem stakeholders aimed at sharing, identifying and validating the strategic plan to be adopted and the common changes needed (Kotter 1996). To monitor this action, we suggest to assessing the degree of diffusion of the change, identifying the most involved organizational areas belonging to the ecosystem.

3.5 Promote acceptance of the new technology

3.5.1 Act on the perceived usefulness

Moreover, the different ecosystem actors could have the perception that the technology is not able to manage or can hinder interactions between all of them (Briscoe 2011). For that, we suggest to sharing information materials about the technology (Venkatesh 2000) and, to monitor the effect of the action, we propose to collecting feedbacks by ecosystem actors on the perceived usefulness of the technology according to their specific activity.

3.5.2 Act on the perceived ease of use

Moreover, another limit of the innovation could be the perception that one or more actors will not perform in the efficient use of the new technology, appearing as a restraint on the entire ecosystem (Briscoe 2011). As a change management action, the model suggests to establishing periodic test sessions between different actors and training days regarding the shared use of technology (Venkatesh 2000). To monitor the action, we also suggest to collecting feedbacks about learning in the use of the new technology.

3.5.3 Act on the subjective involvement

Another risk could be that some actors of the ecosystem feel less involved than others in the change process (Autio 2014). For that reason, it is important to avoiding polarization or centralization of decision-making power, so as to promoting a vision of collective growth and to encourage the involvement of all the actors (Briscoe 2011). Moreover, to evaluate the impact of the action, the model suggests to monitoring the level of ecosystem actors' subjective involvement.

3.5.4 Leverage individual characteristics

In order to overcome the perception of inadequacy or technological backwardness of one ecosystem actor compared to the others (Autio 2014), the model suggests to promoting coaching by the most technologically advanced actors during initial phases (Venkatesh 2000), in order to provide all the other ecosystem actors with the means necessary to accept and use the new technology. The model suggests also to monitoring individual perception towards the new technological solution.

3.6 Enlist a group of volunteers

Moreover, some ecosystem actors regarding how change will affect their reality could felt fears and uncertainties (Aarikka-Stenroos 2017). In this case, we propose to enlist a group of volunteers for each ecosystem actor to promote a common message with the aim of transmitting the same vision and the same change strategies (Kotter 1996) to all the ecosystem actors. This action could be evaluated monitoring the size and skills of the group of volunteers and the effectiveness of the adopted communication channels.

3.7 Remove obstacles to change

In some cases, could also occur conflicts of interests, adversity to change and bureaucratic rigidities in the interaction between the main ecosystem actors (Razavi 2009). For that reason, it is important to organize meetings between the various ecosystem stakeholders to share the benefits deriving from the change, without neglecting the interests of the different realities, promoting a perspective of knowledge mobility (Lewin 1951). To monitor the action, the model suggests to estimating the level of satisfaction of the ecosystem actors involved in the change.

3.8 Show short-term results

Another risk of an innovation project in a complex digital ecosystem could be the risk of isolation or frictions between the different ecosystem actors once the initial enthusiasm is exhausted (Razavi 2009). To overcome this limit, the model suggests to organizing meetings between the main ecosystem stakeholders aimed at sharing the short-term results achieved and collecting feedback on the vision and common strategies defined (Kotter 1996; Autio 2014). This action could be monitored measuring the actual achievement of the expected short-term results and investigate potential gaps.

3.9 Accelerate change

Another limit to the innovation could be the different timelines and inhomogeneity in the implementation of the change between the different ecosystem actors (Razavi 2009). In this case, we suggest to periodically checking that change activities are carried out (Kotter 1996) by all ecosystem actors, organizing meetings aimed at enhancing the obtained results and solving any critical issues or problems that emerge. To monitor the action, the innovation team could evaluate the level of involvement of the ecosystem actors and the effectiveness of the dissemination activities.

3.10 Firmly anchor new practices to corporate culture

Finally, there is the possibility that, in the long term, individualist behaviours of single actors may affect the interoperability of the ecosystem (Razavi 2009). The model suggests to identify different actors, who have proven to have the skills related to the change process (Kotter 1996), as points of reference for all the other ecosystem players and celebrate their role played in achieving change. This action could be monitored measuring the overall impact of change on the ecosystem with a dashboard of indicators that underline the effectiveness, quality and safety of the innovation.

A synthesis of the ten activation phases, with the proposed change management actions with the limitations overcome by the action and the indicators suggested to monitor the action, are synthetized in the following table.

Table 1: New framework for change management in a digital ecosystem

	Identified limitations	*Change management actions*	*Indicators for monitoring change management actions*
1. Top management commitment	Poor perception, by the top management figures belonging to the ecosystem, of the common benefit derived by the implementation of the proposed change	Identify one or more top management figures in the ecosystem who can support the proposed change within their organizational contexts	Monitor the involvement level of top management

		Identified limitations	*Change management actions*	*Indicators for monitoring change management actions*
2. Create sense of urgency		Resistance and lack of perception of the need for change by the ecosystem actors	Manage different meetings with the ecosystem actors in order to promote the need for change and collect their feedback	Monitor the number of feedback and contributions provided by the ecosystem actors
3. Form a strong coalition		Lack of involvement of the different ecosystem actors	Encourage continuous and constant communication between all ecosystem actors involved in the innovation	Monitor the level of involvement and harmony of the leading coalition
4. Develop a vision		Failure to identify the common changes and the change management strategy needed by all actors belonging to the ecosystem	Organize preliminary meetings between the main ecosystem stakeholders aimed at sharing, identifying and validating the strategic plan to be adopted and the common changes needed	Assessment of the degree of diffusion of the change, identifying the most involved organizational areas belonging to the ecosystem
5. Promote acceptance of new technology	5.1 Act on the perceived usefulness	Perception that the technology is not able to manage or can hinder interactions between the different ecosystem actors	Share information materials about the technology	Collecting feedbacks by ecosystem actors on the perceived usefulness of the technology according to their specific activity
	5.2 Act on the perceived ease of use	Perception that one or more actors are not performing in the efficient use of the new technology, appearing as a restraint on the entire ecosystem	Establish periodic test sessions between different actors and training days regarding the shared use of technology	Collecting feedbacks about learning in the use of the new technology
	5.3 Act on the subjective involvement	Risk that some actors of the ecosystem feel less involved than others in the change process	Avoid polarization or centralization of decision-making power, so as to promote a vision of collective growth and to encourage the involvement of all the actors	Monitor the level of ecosystem actors' subjective involvement
	5.4 Leverage individual characteristics	Perception of inadequacy or technological backwardness of one ecosystem actor compared to the others	Promote coaching by the most technologically advanced actors during initial phases, in order to provide all the other ecosystem actors with the means necessary to accept and use the new technology	Monitor individual perception towards the new technological solution
6. Enlist a group of volunteers		Fears and uncertainties felt by some ecosystem actors regarding how change will affect their reality	Enlist a group of volunteers for each ecosystem actor to promote a common message with the aim of transmitting the same vision and the same	Monitor the size and skills of the group of volunteers and the effectiveness of the adopted communication channels

	Identified limitations	*Change management actions*	*Indicators for monitoring change management actions*
		change strategies to all the ecosystem actors	
7. Remove obstacles to change	Conflicts of interests, adversity to change and bureaucratic rigidities in the interaction between the main ecosystem actors	Organize meetings between the various ecosystem stakeholders to share the benefits deriving from the change, without neglecting the interests of the different realities, promoting a perspective of knowledge mobility	Estimate the level of satisfaction of the ecosystem actors involved in the change
8. Show short-term results	Risk of isolation or frictions between the different ecosystem actors once the initial enthusiasm is exhausted	Organize meetings between the main ecosystem stakeholders aimed at sharing the short-term results achieved and collecting feedback on the vision and common strategies defined	Measure the actual achievement of the expected short-term results and investigate potential gaps
9. Accelerate change	Different timelines and inhomogeneities in the implementation of the change between the different ecosystem actors	Periodically check that change activities are carried out by all ecosystem actors, organizing meetings aimed at enhancing the obtained results and solving any critical issues or problems that emerge	Monitor the level of involvement of the ecosystem actors and the effectiveness of the dissemination activities
10. Firmly anchor new practices to corporate culture	Possibility that, in the long term, individualist behaviours of single actors may affect the interoperability of the ecosystem	Identify different actors, who have proven to have the skills related to the change process, as points of reference for all the other ecosystem players and celebrate their role played in achieving change	Measure the overall impact of change on the ecosystem with a dashboard of indicators that underline the effectiveness, quality and safety of the innovation

4. First application: the LIFEMED project

To prove its validity and reliability, the new change management framework has been applied in the project of digital innovation in healthcare "LIFEMED – Integrated Logistics of Medicines and Medical Devices" funded by the Italian Ministry of Education, Universities and Research (Ministero dell'Istruzione, dell'Università e della

Ricerca). The overall result of the project is a new end-to-end process model to manage the logistic of medicines and medical devices in hospitals and outpatient clinics, enabled by an integrated digital platform (Locatelli 2019).

The application of the framework in LIFEMED provided some examples on how the change management actions can be carried out throughout a specific digital ecosystem. Following the first steps of the new change management framework, we describe hereby some actions applied in the LIFEMED project.

In the mentioned project, preliminary meetings with the Strategic Directors of the healthcare centers involved in the project were organized, in order to collect the change needs and ensure *the top management commitment*.

Then, following meetings were also organized with other relevant actors of the overall ecosystem: clinicians, nurses, hospital pharmacy, information systems roles, etc.. Moreover, not only the healthcare centers representatives were involved, but also the technological solutions providers were included in different meetings. These meetings aimed at *forming a strong coalition* and *creating a sense of urgency* related to the innovation needs among all the actors of the ecosystem. Moreover, a *common vision was developed* within the digital ecosystem and it was the thread that guided all the design activities of the LIFEMED digital solution.

Finally, to foster the ecosystem perspective, all the actors, especially the technological solution providers, were encouraged to constantly communicate with other actors of the reference ecosystem, such as stakeholders of the healthcare facilities.

Some general lessons learnt emerged thanks to the application of the framework within the project. In fact, the application underlined that, before involving all the actors of the digital ecosystem, it is important to have the top management commitment of the main actors concerned by the innovation (e.g. in the project, it was very important the preliminary involvement of the Strategic Directors of the healthcare centers).

Moreover, it is important to involve also the digital solutions providers since the first steps of the innovation projecting, because they could facilitate the implementation of the digital innovation, but at the same time, they could raise some feasibility constraints.

As these meetings include different actors, it is important to speak the same language. For that reason, it is useful to involve some “hybrid” figures who can mediate the discussion among the digital providers with their technical language and the other actors of the digital ecosystem.

Finally, as regards the specific healthcare context, is important to involve also some representatives of the public authorities, because sometimes the main constraints to the innovation in healthcare are related to the regulatory field, thus expanding the ecosystem actors involved in the innovation project.

5. Conclusions

As described in this paper, it has been created a new framework to approach the change management to a digital ecosystem. In fact, this generalized framework, compared to models referred to individual organisations, focuses on short- and long-term change management actions thanks to which all the actors belonging to the digital ecosystem can face innovation through their interaction, communication, joint contexts and shared purposes and interests. Furthermore, accordingly to the strategic key principles in approaching an ecosystem (Adner 2016), actors’ continuous involvement and steady alignment will be highlighted as crucial actions to ensure that the innovation is carried out jointly throughout the whole digital ecosystem. In order to have a first practical application of the framework, it was decided to use it into a project in the field of logistics in healthcare. This first practical application of the framework gave elements for the refinement and validation of the theorized model. However, it will be important to apply the described model in other fields: this further research will be necessary to test the framework feasibility and replicability in every context.

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Student Reflections of the Difficulties Associated With Taking Entrepreneurial Action

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Abstract: Entrepreneurship education has become a popular topic, with a diverse field of enquiry examining how best to teach the topic to aspiring entrepreneurs. There is general consensus that having students engage in real-world entrepreneurial activities is a positive pedagogical approach. Observing students engage in attempts to start their own businesses as part of a bachelor level programme has revealed that many of the students struggle to take the necessary steps to successfully launch a business and often become 'stuck' at some point or reluctant to take further action to enable their businesses to grow. Students confirm that they know what needs to be done in their nascent businesses, but struggle to take the required action. The issue lies not in their knowledge of what to do, but in a reluctance to act. Therefore, this article explores from the point of the student their perceived reasons for not engaging in additional entrepreneurial activities. It aims to highlights the fears, resistance and demotivating factors that play a role in influencing students decision to act entrepreneurially. The paper highlight areas where educators can focus their energy and efforts to enable students to have more constructive learning experiences. The paper is based on qualitative interviews with 20 students. The data comes from a singular course at a bachelors level course in Norway, and does not seek to provide conclusive evidence or a taxonomy of all the reasons that stall student progress. Instead, the article provides an exploration of key themes that can be used to guide future research on the topic of student experiences with practical pedagogical approaches to entrepreneurship. While much has been written on the positives of having students engage in entrepreneurial activity, this article sheds light on the areas for improvement and the difficulties associated with having students start their own business.

Keywords: entrepreneurship, motivation, pedagogy

1. Introduction

The field of entrepreneurship, and particularly entrepreneurship education has seen a growth in publications and popularity the last decade. It seems the question of whether we can even educate people to become entrepreneurs is still under debate (Klein and Bullock, 2006). Those who subscribe to the camp that entrepreneurship can be taught are focussing their efforts on how best to educate students to become entrepreneurs and exploring what pedagogies work and which do not (Neck and Corbett, 2018, Neck et al., 2014, Morris et al., 2013, Fayolle, 2013, Nabi et al., 2016).

One prominent view is that the most effective pedagogy for generating entrepreneurs is to have them have real-world lived experiences of starting their own business (Neck et al., 2014, Rasmussen and Sørheim, 2006), a perspective held by the authors of this article. Yet, at the same time our lived experience of teaching courses focussed on having students start their own business is that few if any students manage to create sustainable businesses during the course, and few if any become full time entrepreneurs immediately upon finishing their studies. Based on our observation of other entrepreneurship programmes and our conversations with others in the field, this seems to be a common issue.

The reasons for why many students do not become entrepreneurs are potentially many, it might even be argued that this is unproblematic. There are some in the field who argue the purpose is to give students a realistic taste of entrepreneurship so that in later life that can make more informed decisions about whether starting for themselves is an appropriate choice. Existing literature provides some insights on why students might be enthusiastic enough to study entrepreneurship but still struggle with the process of venture creation. One of the best predictors of whether someone will take an action is to examine their intentions (Krueger and Carsrud, 1993, Shaver and Scott, 1991). Yet theory is relatively silent on the significant percentage of people who have clear intentions to be entrepreneurs do not manage to make take action (Lynch, 2020).

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Therefore, this article aims to carry out exploratory research into what reasons stand in the way of those who have clear entrepreneurial intentions that leads them to not taking action. The practical relevance of this research question is that is can guide further teaching interventions to better support students of entrepreneurship. If we better understand what is stopping students from starting their business, then we can begin to design interventions that anticipate and resolve these issues, and in the long run increase the numbers of those who leave entrepreneurship courses with a formed business that they can continue to run.

2. Entrepreneurial intentions

Although many models have been used to explain entrepreneurial action, intentions continues to be one of the most widely used and generally confirmed models (Fayolle et al., 2014). The theory of planned behaviour states that intention is a strong predictor of expected behaviour (Ajzen, 1991), and that desirability and perceived achievability antecedents to intention (Geenen et al., 2016, Brandstätter, 2011). The perceptions of desirability and feasibility are highly subjective in nature and are strongly influenced by personal beliefs and values (Fayolle et al., 2014). Desirability and feasibility are not equal, and where there is a lack of perceived feasibility (belief in requisite skills) this can be countered by a strong focus on desirability (Fitzsimmons and Douglas, 2011). This might imply that those who do not manage to achieve entrepreneurial outcomes simply do not want it, or simply did not believe they could achieve it. While there might be elements of truth in this, the theoretical explanation seems to lack nuance and therefore invite research into the reasons why those with clear intentions to start (having enrolled in an entrepreneurship course) do not manage to generate the outcome of a financially sustainable business.

A slightly more nuanced model of human behaviour is the behavioural activation (BAS) and behavioural inhibition system (BIS)(Gray, 1994, Gray, 1970, Nigg, 2000). This has only recently begun applied to the field of entrepreneurship (Lerner et al., 2018), examining the ways in which both perceived inhibiting factors and desirability factors can play a role in guiding action. Despite the long existence of theory in the field of psychology, it appears to mostly absent in entrepreneurship, and those articles that have used this system are relatively uncited (Lerner et al., 2018, Geenen et al., 2016).

A brief overview of the BIS and BAS systems, says that BAS system move people towards actions where there is a perceived benefit. While BAS systems focus on avoiding and preventing perceived negative outcomes. The BAS systems can be broken into 3 subsystems, these are reward responsiveness centred on the anticipation of a reward, fun seeking focussed on seeking impulsive rewards or novelty; and drive which revolves around taking action to achieve desired outcomes (Carver and White, 1994). While the inhibition system can be broken down into two parts that together represent a conflict detection, risk assessment and appraisal system (Geenen et al., 2016). The first of two parts of BIS is anxiety, which captures the notion of worry about social comparison, failure and are connected to conflict and uncertainty (Heym et al., 2008). While the second part is fear, which correlates with the flight or flight mechanisms and leads to aversive responses in individuals (Heym et al., 2008). The systems has also been described as a break and accelerator system in terms of response in individuals, where the breaks and accelerator are independent at can even be in conflict.

Lerner et al. (2018) argues that the Theory of planned behaviour (intentions) model and the BIS/BAS systems are not in conflict, but rather can offer complementary perspectives with regards to complex difficult to predict human behaviours -such as those associated with entrepreneurship. Lerner describes the intentions model as being top down, whereby individuals set distant goals that they then strive to achieve. While the BAS/BIS system is bottom up and explains responses to more immediate stimuli. Given the process of entrepreneurship is long and arduous, with many small steps and activities that constitute the process of venture creation, it is logical to consider both the long-term motivations, and the smaller momentary responses. Especially given that most of our day to day behaviours are made up of our conditioned response systems (McAdams and Pals, 2006).

The empirical studies from prior studies suggest a negative correlation between BIS and firm performance (Lerner et al., 2018) and entrepreneurial experience (Geenen et al., 2016). Interesting in BIS does not correlate negatively with intentions, but does with entrepreneurial action (Geenen et al., 2016). One interpretation of these results is that individuals might form entrepreneurial intentions, but when faced with the reality of the actions required their inhibition systems slows down or prevents them from taking the necessary actions (Lerner et al., 2018).

The implication of this interpretation is that individuals with entrepreneurial intentions might prevent themselves from taking the necessary actions due to fear and anxiety about their perception of the entrepreneurial challenge at hand. This plays an important role with regards to teaching interventions and mentoring of students of entrepreneurship. If it were possible to identify common fears and anxieties with regards to entrepreneurship, then there might be the potential to form interventions that support students to act on their intentions.

Based on the theory discussed so far, the BIS/BAS system predicts that perceived fears and anxieties will be sufficient to prevent entrepreneurs from taking action, or at least slow down their progress (Lerner et al., 2018, Geenen et al., 2016). Yet there is little known about what specifically these fears and anxieties are for individuals engaged in entrepreneurship. Therefore, our research question is *what common fears and anxieties are raised by students of entrepreneurship when asked to reflect on their experiences of starting a business?* We use this study to better explore the potential inhibiting factors as described by students.

3. Methodology

The interviewees are students from a bachelor's level course, who were in the second year of a programme called Innovation and Project Leadership. The course they were participating in is called 'Studentbedrift', which directly translates as Studentbusiness.

The course runs over two semesters and is equivalent to 10 ECTS (where 30 is a standard workload for a semester). Students are expected to invest around 250-300hours in the course, and receive around 65-70 hours of contact teaching and mentoring. They are required to work in self-selecting teams of 3 – 6 people, and are encouraged to form teams with a mix of genders.

The course has a heavy focus on the practical elements of starting a business. The students are graded on the quantity and quality of steps taken in order to make their business real, and are expected to find customers and generate cashflow under most circumstances. As the course was conducted during the Covid-19 pandemic the teaching was a mix of physical classes in the start of the first semester, and digital teaching for the remainder.

The course loosely uses the framework set out in Disciplined Entrepreneurship (Aulet, 2013), although it does not rigidly follow all steps. The students are encouraged to identify a customer group and their needs, to generate prototypes, and launch minimum viable versions of their business, and scale them if they work or pivot if the feedback from the market is not positive.

The interviews with students were carried out midway through the second semester, when all teaching had already been conducted, and only mentoring sessions were remaining. This was selected a relevant time to conduct the interviews, as the students had received all the theory connected to the course and were focussed on trying to generate more traction for their business concepts.

The interviews were carried out as semi-structured interviews, where as much space was given to the students as possible to steer the direction of the conversation. The intent was to avoid asking the research question, or coming with suggestions about what was standing in the way of the students progressing further and at a quicker pace. In this sense every effort was made to avoid leading questions that would have resulted in biased answers.

At the beginning of each interview it was communicated to students that the interview had no bearing on their grades, that the author was interested in their honest opinion, and the main purpose was just to better understand student experiences with starting their own business. The interviews were conducted in the students' native language (Norwegian).

A total of 30 interviews were conducted, although not all of the interviews were used as data for this article. A decision was used to exclude some interviews where the conversation topics were too tangential and no longer relevant to the research. Examples of topics that lead to interviews being excluded included things like students wanting to discuss personal issues such as a death in the family, breakups, or difficulties associated with the ongoing pandemic. There were also a number of students who were less forthcoming with information, and did not talk freely about their experiences, leading to little data, and therefore being excluded from the sample. We

fully acknowledge the potential for bias in this selection of data, however, consider it justified I order to use quality data in the attempt to generate answers to the research question.

The interviews lasted between 15-30 minutes, with the majority averaging 20 minutes. The interviews were recorded, and detailed notes were created during the original interview. The interviews were watched after, and the original notes were then checked and supplementary information included where relevant. These notes were then coded for recurring themes, and key quotes and important ideas highlighted. These key findings form the basis of the next section, and are the foundation for the discussion that follows after.

The research is qualitative in nature and does not aim to substantiate the existence of any particular proposition about student experiences of creating their own business. Instead, the purpose of the research is to examine students' perceptions in order to generate insights into potential internal hinderances in the process of venture creation.

4. Findings

As the sample size is small and the research is qualitive in nature, we have not made any efforts to rank order the potential inhibitors described by student entrepreneurs. We do not wish to imply that the findings somehow have found the 'largest' or 'strongest' reason for preventing entrepreneurs from starting, but rather to disentangle possible themes for future research. We acknowledge the high level of subjectivity associated with the findings and their interpretation. This subjectivity correlates with the studies designed intention which is to explore the motivational systems in context.

4.1 Positive

The students were overall positive, and seemed to express a desire to continue with the process of starting their business. They often started the interview with expressing positive sentiments, and that they enjoyed the course, which was often followed by a description that the process of starting their own business was difficult and challenging. The reasons why it was challenging are detailed below, but that the students were overall expressing a positive sentiment seemed worthy of noting. Especially in relation to the difference between top down and bottom up motivational systems as we examine under the discussion.

4.2 Perceived pace

Multiple students discussed their perceived pace of carrying out their entrepreneurial activities. Most acknowledged at times they could have acted fasters, and carried out more activities. However, they generally communicated that they perceived their start up pace to be appropriate within the context of the course. They did not express a need to work faster or put in more hours. There were a few notable exceptions, with 4 students stating they thought they should be moving much quicker. Interestingly 3 of these self-report as having ADHD – while not the main focus of this study and interesting correlation that matches with current themes of research elsewhere. This theme of acceptable pace of development struck the authors as interesting given that many of the student groups were still very much in the nascent phases of starting and seemed to be unlikely to fully realise their entrepreneurial goals in the two semesters.

4.3 Pivoting for progress

Many students discussed the point that their projects had become stuck towards the end of the first semester and were conscious that they were not making progress further. Several students mentioned they were aware the current approach of their team was not working, but did not want to discuss it in the team because they were worried of being perceived as negative and problematic. Multiple students mentioned that having decided to pivot their business direction, the team regained momentum, and felt like they were making progress again towards launching a business.

4.4 Momentum and motivation

Both momentum and motivation were themes that was repeatedly raised by students. For example, one student noted they were aware that it was safe being on the lazy side, because taking contact with external stakeholders to help progress their business was perceived as scary. They therefore accepted that they would work slower and procrastinate on some tasks. Many students mentioned struggling with motivation. It is worth noting that

the research took place under Covid-19 restrictions, which meant many of the students had not met each other physically for several months. The role of this in influencing students' motivations should not be dismissed. They mentioned that motivations of others tended to influence their own motivations, and that at times the group energy level could either drag them down or lift them up depending on their own relative mood.

4.5 Team conflict

The most common discussion point was team conflict, with most teams seeming to have a smouldering conflict that would reignite at several points. Given conflicts are subjective in nature, and each participant seems to have differed and often conflicting perceptions of the conflict, it can difficult to attribute exactly what causes the conflict.

However, there seems to be underlying themes of (mis)communication, differences in beliefs, differences in attitudes, and differences in motivation, and that others motivation is contagious in nature. That having team debriefing can be useful, but is not always a solution. There also seemed to be the recurring theme that people are hesitant to take up conflict.

5. Discussion

The intention is to examine the common themes raised by students in relation to the motivational systems mentioned in the theory section, particularly the interplay of top down motivations such as intention, and bottom up motivations systems (BAS/BIS), with a specific focus on the inhibiting factors that can prevent students taking the required behaviour.

That students were positive suggest there is support for the overarching goal of starting a business and being an entrepreneur. Which would suggest that had a more formal survey tool been used there would be present a strong intention to start a business, with evidence of having taking action to start the business. The interesting elements then become the reality of starting a business and the individual tasks. It is natural that different people will react differently to stimuluses, so therefore some tasks will seem more unappealing to that others depending on your own individual conditioned responses. A potential space for further exploration of this theme would be to examine what individual tasks are sufficient to stop entrepreneurs from continuing, and how desirable must the desired outcome be for students to overrule their own inhibition systems that cause them to avoid action.

The perceived pace raises an interesting dilemma of what is the correct pace in which to start a business. Prior literature examining pace of startup says that if someone is not successful in starting a business within 12 months, then they are unlikely to achieve this. One particular interpretation of the students' perception of pace is that students use a 'go slow' approach to avoid encountering situations that they find uncomfortable. That is the BIS system focussed on reducing fear and anxiety uses a slower pace to allow students to become slowly more comfortable with the novelty and uncertainty which is a key part of entrepreneurship. Anxiety is associated with social settings and avoiding failure, at the same time learning entrepreneurship is social in nature. The slow pace also allows students to not make mistakes that would be noticed by others, and might be socially construed as failure, therefore the slow pace is a response mechanism focussed on keeping students feeling safe.

While pivoting was according to students a positive outcome, equally interesting was that students perceived the need to pivot but had been unwilling to raise this amongst team members. One potential explanation of this is in correlation g to a lack of psychological safety, where students feel unsafe to express their internal worlds to others and share their desire to change the startup strategy. Again, this could be attributed to the BIS system, and the associated social inhibition of anxiety. The thought of raising a reality that was discontinuous with their group members realities meant they experienced anxiety. As research ahs found, one team member who is not in alignment with the group is sufficient to cause team problems (Felps et al., 2006). The students expressing this seemed unaware of the potential impact that their hidden hesitancy potentially has on the group.

The seesawing motivation described by many students seemed to correlate with their perceptions of the task at hand and is consistent with prior literature looking at emotional experiences in entrepreneurship (Lackéus, 2014). When questioned students were willing to admit the tasks that they were struggling with were not objectively difficult, but rather had been constructed in their head to be something that should be avoided, or at least procrastinated upon. Here we see that the top down motivational system might be responsible for the

continued perseverance in the long run grind of starting a business, but that the day to day motivation can wane based on small tasks that are perceived as hinderances. This speaks to students mental picture of what entrepreneurship involves, and that they were not fully aware of the types and magnitude of task they are required to be involved in.

The final theme mentioned was team conflict and seemed to be present in all of the 10 teams participating in the course. That conflict should occur in small groups working closer together seems natural and largely unavoidable (Kollmann et al., 2017, Kozlowski and Bell, 2012). The difference we posit is how teams deal with conflict. Here we can see the anxiety and fear elements of BIS playing a clear role in creating issues for the start up teams. When individuals are afraid or anxious about sharing their perceptions for fear of conflict, then the results is not less conflict, but rather a smouldering conflict and teams issues that perpetuate until they are resolved.

6. Teaching implications

The implications for teaching are several, the first is a greater need for students to lift their general level of self awareness with regards to their own motivations, and the factors, task and situations that are generating fearful or anxiety laden responses inside of them. This course requires students to journal on a weekly basis reflect on their internal worlds. The importance of emotions in entrepreneurship education has previously been acknowledged but only briefly explored (Lackéus, 2014). However, we would posit that a student having greater awareness of their perceptions of fear and anxiety would be better placed to coach themselves through the required steps to overcome the inhibition system that is applying a break to their entrepreneurial actions.

Given the ubiquity of team conflict within the course (and teams in general), it would seem that there is need to focus on team conflict resolution as a core component of practice based education courses. Prior teaching efforts in the course have provided initial conflict resolution methodologies, and there was some evidence of these being helpful, as the same time it appears that there is a greater need to focus arming students with the tools they need to engage in healthy conflict that leads to alignment with a team.

The implication for teachers might be that there is a need to identify the individual triggers for students fears and anxieties, and to have students engage in a process that allows them to work through these emotions that inhibit action. We do not mean to suggest teachers should be responsible for solving individuals' inhibitions, as these are solely resolvable by the individuals experiencing them. The teacher though may be able to create interventions that maximises the chance that students will be nudged towards resolving them in a healthy and constructive manner.

Overall the implication of this research is that entrepreneurship is a personal journey in which small tasks or hinderances can be magnified to game-stopping proportions inside students' minds. That the acknowledgement of the role of the inhibition systems, and subjective perceptions in influencing students' actions appears to play an important role warranting further research. In creating socially constructed learning where practical entrepreneurship plays a crucial role requires teachers to be mindful of these factors, and create spaces where the internal worlds of aspiring entrepreneurs can be explored and shaped to generate the desired outcomes.

7. Conclusion

The research highlights a number of ways in which students' cognition or perception of their startup process is interfering with their entrepreneurial progress. The articles aims to link these perceptions with the motivation systems described by the behavioural activation (BAS) and behavioural inhibition system (BIS)(Gray, 1994, Gray, 1970, Nigg, 2000). Earlier models such as the theory of planned behaviour have done a good job of explaining why students want to start businesses, but has struggled to explain what has stopped them once they started along their journey. The article sheds light on internal perceptions of students who have clear intentions to start a business but are struggling to do so. The article highlights that teaching interventions can pay closer attention to the subjective internal worlds of those currently on an entrepreneurial journey if we are to best assist them to reach their destination. The research is exploratory in nature, but suggests paths for future research such as examining whether raised personal awareness correlates with task performance. Whether interpersonal communication coaching can reduce team conflicts and lead to better outcomes, and whether making students aware of the BIS/BAS systems would influence their behaviour.

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Entangling Corporate Innovation, Systems Thinking and Design Thinking

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Abstract: The world faces an increasing number of environmental problems such as climate change, depletion of biodiversity, plastic pollution and the side effects of mining. In a world with so many environmental challenges creating additional consumer items, even when they are labelled environmentally friendly, can and does have environmental consequences. We suggest that design thinking can and should include a more holistic systems thinking perspective as part of its drive to encourage corporate innovation. We argue that design thinking should take a much wider view of who are their stakeholders. In order to demonstrate the connection between corporate innovation, systems thinking and design thinking, we draw on a case study regarding the creation of a new data center. The case demonstrates how design thinking with elements of system thinking can be used to generate solutions that has positive impacts for multiple stakeholders, including the environment. The case study demonstrates that these combined perspectives can also be used as a teaching model to shift students' mindsets towards not just finding solutions that suit a customer or a project owner, but also the environment and other stakeholders. The case demonstrates that practical positive results can be generated over a short period of time, with little investment. The case also highlights a successful approach to industry/university collaborations. The research delves into the basics of systems thinking, and how there is a connection with design thinking. We then discuss the teaching methodology and approach to using design thinking/systems thinking to solve the case challenge. We then present the results of the challenge and the discussion regarding how such projects can play a role in shifting students' mindset towards having a more environmentally friendly perspective while engaging in corporate innovation.

Keywords: design thinking, systems thinking, corporate innovation, industry-university collaborations

1. Introduction

The world faces many challenges – climate change, depletion of biodiversity, plastic pollution and the side effects of mining to name a few (Coad et al., 2021, Brem and Puente-Diaz, 2020). It is the economic systems that are dependent on nature, and not the other way around (Jensen, 2006). Yet existing economic systems are complex in nature and are made up of an interconnecting web of stakeholders with differing interests and incentives (Sillitto et al.). If we are to find solutions that overcome these wicked problems then we need methods for innovation that take into account differing stakeholders, one of the original promises of design thinking (DT) (Dunne and Martin, 2006, Rittel and Webber, 1973, Brown, 2008).

Traditionally, entrepreneurship has played a key role in transforming markets through the introduction of innovative products and services (Shane and Venkataraman, 2000). The forefather of entrepreneurship as a field, Joseph Schumpeter, famously described this change making process as the perennial gale of creative destruction as entrepreneurs and firms continue to act entrepreneurially through innovation in search of sustainable profitability (Wiggins and Ruefli, 2005, Schumpeter, 1942). While much has been written about the term, at the core of the message is that entrepreneurs are the catalyst that bring about the destruction of old patterns through the creation of new (Wiggins and Ruefli, 2005). Yet if we review entrepreneurial progress in the last decades there might be cause for concern (Coad et al., 2021). It seems the perennial gale of creative destruction is mostly leading to the destruction of the natural world in which we inhabit.

One of the key issues with entrepreneurship is its singular focus on maximizing the returns for shareholders. Systems thinking tells us that optimizing for a single parameter leads to the suboptimization of the system as a

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whole (Stroh, 2015, Senge, 1990). In optimizing for profit of individual firms, we suboptimize for the bigger system we are a part of.

We argue for the need to begin to take a wider stakeholder perspective in the creation of new ventures, where we aim to optimize for system (that include nature) and not suboptimizing for the individual businesses. One of the greatest points of leverage for changing a system is to focus on changing the mindsets of those involved in the system (Meadows, 1999). If we are to change the system, then a logical starting point according to Meadows is to begin with shifting the mindset. This article explains how DT can be used to shift students' mindsets towards having a more systemic mindset when creating businesses. While combining systems thinking, entrepreneurship and DT might seem like a lot, we think it can be simplified with the following analogy. Environmentally sustainable solutions are the destination, entrepreneurship the vehicle we use to get there, systems thinking are the roads we need to navigate to avoid pitfalls, and DT is the map that allows us to take the drive.

The article briefly introduces a combination of design thinking, entrepreneurship and systems thinking. It then provides an example of a teaching case that aimed to shift students' perspectives from suboptimizing at the level of the individual firm, to taking a wider perspective of value creation that included considering the environmental impacts of any new businesses. The purpose of this article is not to demonstrate conclusively that students' mindsets were shifted, but instead to shift the topic of conversation in our field to considering the wider implications of teaching entrepreneurship and how this can be used in support of a more environmentally friendly future.

2. Literature review

As Meadows pointed out "Hunger, poverty, environmental degradation, economic instability, unemployment, chronic disease, drug addiction, and war, for example, persist in spite of the analytical ability and technical brilliance that have been directed toward eradicating them"(Meadows, 2008)(p. 5). These are systems problems that, as she addressed, will not disappear until someone finds "the courage and wisdom" to restructure these systems.

Systems thinking is rooted in the understanding that society is so complex that linear ways thinking, and analyzing problems are insufficient and even counterproductive. This thinking has been developed based in the understanding that it is not enough to study only parts and processes in isolation, but to solve problems from dynamic interaction of parts (Von Bertalanffy, 1973).

> *Similar general conceptions and viewpoints have evolved in various disciplines of modern science. While in the past, science tried to explain observable phenomena by reducing them to an interplay of elementary units investigable independently of each other, conceptions appear in contemporary science that are concerned with what is somewhat vaguely termed "wholeness" (Von Bertalanffy, 1973)(pp. 36-37).*

Von Bertalanffy (Von Bertalanffy, 1973) describes how systems thinking is a collective of methods, concepts and techniques that are used to understand a phenomenon where there are strong interactions between different parts which together make up complex systems like those in entrepreneurial studies and sustainable development.

Classic systems thinking literature focusses on balancing forces and counter-forces in order to uphold equilibrium, which adequately explain how the current social issues already mentioned have come to be. Newer literature, such as Cabrera (Cabrera et al., 2008), point towards a better understanding of the complexity in the models and thus developing more enhanced mental models. The challenge lies in that when we change a system it is difficult to predict the effects that will result from those changes. A singular change can have flow on effects, leading to 2nd, 3rd and nth order consequences (Taleb, 2012, Rittel and Webber, 1973). This is not something readily discussed in entrepreneurship literature, meaning entrepreneurs mental models are not well equipped to see the consequences of any new service or product that they may launch. Entrepreneurship as a field does not train nascent entrepreneurs to see the totality of their choices.

Entrepreneurship may be understood as a system or network of interconnected actors, intimately related to today´s complex societal challenges like sustainability. Yet, this is a topic that is rarely discussed within teaching environments. A systemic literature review of entrepreneurship education (Pittaway and Cope, 2007) makes no

mention of sustainability and only a passing mention of social entrepreneurship. While a more recent article (Jones et al., 2021) focussing on the role of UK entrepreneurship centers in higher education uses the word sustainability only in relation to 'financial sustainability'. We do mean to suggest there is no literature on sustainable entrepreneurship, there is plenty. What we are trying to highlight is that the main conversations around entrepreneurship pedagogy do not have a focus on sustainability, and conversations on sustainable entrepreneurship are their own sub-field.

Attitudes have been rapidly changing with new programmes sprouting up that focus on the intersection of entrepreneurship and sustainability (Cincera et al., 2018). The point being that if we want students to begin to see the environmental consequences of the economic choices they make, then we need to begin to train entrepreneurs to think differently and more systemic, or at least to think more widely in their perspective. A systemic perspective on entrepreneurship indicates a need to explore and discuss more of what relates to or affect the whole of the system the entrepreneur is targeting (Rieckmann, 2012, Sammalisto et al., 2016).

The systemic perspective is embedded in the concept of sustainability introduced in the UN World Commission on Environment and Development report Our common future (World Commission on Environment and Development, 1987) warning of the necessity of making progress toward an economic development that could be sustained without depleting natural resources or harming the environment. The UN sustainable development goals, the Paris agreement, the two-degree scenario (International Energy Agency, 2017), all require policy actions and an array of public and private support across all innovation stages from strategically directed R&D and market creation and technology-specific support, towards holistic support and market pull policies and system integration (International Energy Agency, 2017, p. 10). The situation requires an entrepreneurial mindset that grows beyond an economic viable product and company, and that embraces a systems wide approach to change.

The idea of sustainable entrepreneurship is based on a development paradigm that recognizes that entrepreneurship makes an important contribution to environmental, social and economic development. Yet it still views the value creation unit at the level of the individual organization (Haldar, 2019), and largely ignores the wider systemic implications. As such, it sticks with a more traditionally linear mindset that ignores the kind of 'wholeness' (Von Bertalanffy, 1973) we referred to earlier. Systems thinking can be used to provide a new perspective and tools to broaden the field of influence entrepreneurs consider when innovating.

One of the challenges mentioned so far is that the global economic system of today have reached a status quo that while obviously problematic seems unlikely to change due to the complex mix of stakeholders and power dynamics. This might seem an uninspiring start point, but Meadows (1999) provides some guidance on where best to intervene in such a system. She highlights shifting mindsets of those operating in the system. Meadows points out that change may be brought about by consistently and repeatedly pointing out the failures and assumptions of existing systems to those with an open mind.

In order to bring about this shift in mindset to a more environmentally friendly entrepreneurial business models we need an approach that guides action. Design Thinking is such an approach and has been praised to shift students mindset (Daniel, 2016, Neck et al., 2014, Nielsen and Stovang, 2015, Lynch et al., 2019). Traditional entrepreneurship courses focus on teaching students static knowledge about existing theories and models, and thus on "what is" or "what has been", while DT forces students to be active participants in the creation of their knowledge and focus on "what might be" (Nielsen and Stovang, 2015, Dunne and Martin, 2006). Multiple models of DT have emerged since 1987 (Dorst, 2011), and is frequently portrayed as a series of steps: empathize, define, ideate, prototype and test (Brown, 2008).

DT is a form of teaching that aims at generating new ideas and exploring alternative solutions, instead of picking between existing alternatives (Beckman & Barry, 2007). Design thinking has been regarded as an efficient approach for tackling highly ambiguous situations and unveiling unanticipated problems very early (Fixson & Rao, 2014), and several scholars have argued for its value both in management education (Dunne & Martin, 2006; Garbuio et al., 2018) and in entrepreneurship education (Garbuio et al., 2018; Daniel, 2016; Neck, Greene, & Brush, 2014; Nielsen & Stovang, 2015). Garbuio et al. (2018) state that students tend to easily handle well-defined processes that require analytical reasoning to reach a single answer with significant guidance from instructors. They argue that design cognition provides a way to introduce students to complex, ill-defined

entrepreneurial problems with unclear means-end relationships, and thereby prepare them for what they will meet as graduates. Exactly the kind of problems that society face in the drive for more sustainable outcomes.

3. Method

To illustrate how these differing theoretical perspectives can be used to shift student's mindsets to take a more systemic viewpoint we present a case using DT in solving a real-world problem. The case is not intended to suggest that this is the best approaches to teaching students to think more environmentally, but rather one way that appears to have impacted students' awareness of the complexity of entrepreneurship.

Case-studies are recognized as a relevant real-world research design (Robson & McCartan, 2016) and is especially relevant for producing contextual knowledge (Flyvbjerg, 2006) for manoeuvring within complex processes (Johansen et al., 2020; Van de Ven et al., 1999). Case studies are also appropriate for contemporary and emergent phenomena in a real-world context including real-time and retrospect data (Yin, 2003).

The case come from a bachelor's program, where there were 55 students taking the compulsory first year course. The student's study on a program called innovation and project leadership, which is a 3-year bachelors focused on experiential learning through running a number of projects, including starting businesses, building bridges, organizing wilderness experiences, and providing innovation consultancy services to businesses to name a few of the projects. The students are introduced to a number of differing schools of thought including circular economy, biomimicry, entrepreneurship, systems thinking, product design, lean manufacturing and design thinking.

In this particular case students worked in small teams of approximately 6 people, with the project taking place over two weeks. Students self-selected into teams, and all teams had a mix of genders.

4. Results

The case relates to a corporate challenge, whereby a local land developer is planning a new business park. The corner stone tenant of this development is to be a giant datacenter. A common issue with datacenters is that the servers inside them need to be cooled in order to operate efficiently, as a result there is excess heat energy that needs to be removed from the datacenter and is commonly just extracted into the local environment in the form of warm air via air conditioning (Li and Kandlikar, 2015). According to the information provided by the developer it was expected that 40 MW of excess energy would be expelled into the air each year. The developer expressed concern about the impact on the local environment as well as feeling like this heat would be wasted if it was just dispersed into the atmosphere. To put the figure into perspective, an average home in Norway uses 16.000 kWh2, meaning the excess waste from the datacenter would be equivalent to the power usage of 2.500 homes.

From an economic perspective the development of the datacenter was profitable based on current economic conditions regardless of what happened with this excess heat. As the developer pointed out though, this heat seemed like an underutilized resource. From a technical perspective there is a clear solution as to how to use the heat, so the challenge is not one of technology. The challenge is to create a solution that is positive for multiple stakeholders, including considering the environment as stakeholder.

The students had no prior technical knowledge of the area of heat-recirculation, requiring them to go out and discuss the idea with a large number of companies to better understand the commercial needs of businesses. In some instances, students visited companies to receive tours and discuss with the companies engineers the technical requirements the production facilities needed. They also discussed with the financial officers and CEO's the needs of the business to gain greater insights into whether there was a fit between the waste heat from the datacenter, and what the individual companies needed.

The students worked on the challenge for 2 weeks before having to present their ideas to the developer. The developer was overwhelmingly impressed by the suggestions of the students and stated that the work by the students went well beyond what was expected from them (leading to a longer-term collaboration with students on the project which we do not discuss in detail here). The students provided the developer with a 2-

[2] https://energifaktanorge.no/en/norsk-energibruk/energibruken-i-ulike-sektorer/

page summary of their findings including further leads for the developer to follow up with regards to individual companies and types of industry players who might need this type of heat in their production process.

To draw on an example, one group visited a paper production facility, and discovered that the facility needed around 14 MW of steam production each year. As part of this production, the paper company was paying US$ 4,1 M per year in gas, and US$ 410.000 in carbon credits, and US$ 3,4m in electricity. The company did not reveal which percentage of the electricity bill was related to steam production, but the carbon credits and gas were almost entirely related to steam production, with electricity being used instead of gas when spot prices made it more economic. The students were thus able to identify paper production as a key industry which could benefit greatly from co-locating beside the datacenter. While the particular company the students visited did not express a willingness to move, having recently refurnished their plant, the business case for such a location was clear. This allowed students to begin to narrow their search to other paper production companies who might be willing to shift location. The business case was that the reduction in the cost of gas and carbon credits would be shared equally between the data center and the paper production company, with the commercial upside for the developers being that they could demand a greater price for their land given the benefit of locating there, and as well as being able to use positive publicity around the project to increase their profile.

A separate team focused on a more circular economy perspective, aiming to find a wider range of commercial players for whom waste heat energy might be of use. They identified as examples shrimp farming, algae growth, greenhouses, and insect production as types of commercial players who if co-located together could benefit from synergies associated with each other. The perspective focused on creating a value cluster that also made use of other infrastructure such as roading networks and relatively closely located to major food distribution centers.

Neither ideas are revolutionarily innovative, nor might not even be considered innovative at all given none of the ideas were new industries. Instead, the focus was a more systemic view of how businesses could cross benefit from each other's waste products and create shared value through a non-traditional business model. These have not traditionally been the key focus areas of entrepreneurship education. Traditionally education has focused on using resources to produce something new, and often in the process creating additional waste and pollution (Coad et al., 2021). In this instance, the focus for students was about using the resources currently available (or planned to be available) and finding a way to ensure that they were used instead of simply being wasted. Yet, this requires a reconfiguration in the way business is normally organised.

5. Discussion

We aim to highlight that it is possible to have students shift their mindset relatively early on in their education to have them to consider a wider perspective that goes beyond narrow economic gain often associated with entrepreneurship.

None of the student groups presented a case that focused on maximizing the developers profit only. Rather, they had their focus on generating value across multiple business organizations. This represents a shift in mindset from singular (sub)optimization of an individual organization's profit, to a focus on optimization of a cluster/network of organizations in order to maximize the system as a whole. This represents a clear difference from discussions around sustainable entrepreneurship to date, which focus on improving the environmental outcomes of individual organization's (and/or their supply chains). In including systems thinking, we saw students' perspectives widen in number of ways, as discussed below.

The students were able to see that there was a valuable resource (heat) that could be shared across multiple business organizations. Instead of engaging in typical business development focused on the profit maximization of a single entity, they were able to shift their focus or analysis to the interconnectedness of businesses that could be co-located together in order to create value that was relevant for a cluster of companies.

They were able to see the interconnectedness of a single business activity with downstream consequences, and to design solutions that minimized the impact on the surrounding environment. Viewing the interconnectedness of the business to the surrounding environment, and the potential for negative consequences, allowed them to see the need for a shift in existing ways of carrying out business and that the single metric of profit was problematic.

They were also able to see their own interconnectedness to the project, and that they had the power to influence the final outcomes of the development that was to occur in their local environment. They therefore went from seeing themselves as passive observers, to seeing the agency they had to push the project to head in a direction they considered positive.

In the beginning many of the students were uncertain of how to proceed and felt insecure about their ability to come up with a solution. They were guided through the DT process with strong roots in emergence (Simon, 1996), that pushed them to speak with potentially relevant stakeholders, to seek information, and to create their own questions and sources of answers. In doing so they experienced the emergence of their own understanding, and with it the emergence of solutions and paths forward. A critical philosophical point of emergence is that small changes in starting factors can lead to extremely different outcomes in end scenarios. In this sense they were able to see that their own small interactions in projects could play a large role in determining the outcomes in their local environment.

Based on the observed work of the students and their deliveries, it would appear that there is ample evidence that they were able to manage the existing tensions between these theoretical perspectives and find resolutions that might have been suboptimal for any one organization but were optimal when considered systemic across multiple organizations. In this sense students were able to shift their mindsets towards having agency in creating outcomes that impacted their local environment. As mindsets can be shaped through DT education, we hope this formative education experience helped students to have a mindset that was more sustainable while acknowledging the important roles that setting up commercial systems can have in benefitting everyone.

6. Limitations

We have only begun to explore the concept here of joining the fields of system thinking, DT and entrepreneurship. Given this is a new perspective, it likely lacks nuance and therefore requires further exploration. As a single case study, this is intended only to begin exploring the overlap between the fields, and how it might be taught. We would welcome much more rigorous approaches to examining the ability of teaching to shift students' mindsets in a way that they begin to consider the wholistic picture. We suggest a fruitful path for further research would be to examine students' reflections on their experiences of learning in this manner, and to begin to examine whether there has occurred a shift in mindset.

We advocate for developing a sense of agency in students so as to empower them to make what they consider to be positive change in their environments. At the same time, influencing systems needs to be approached with a genuine sense of caution. As even the earliest systems thinkers pointed out, issues of social systems are incredibly complex, and go far beyond our individual capacity to analyze the way towards a solution (Rittel and Webber, 1973). Going a step further, there has been a great deal of harm done by what has been labelled 'naïve interventionalism' (Taleb, 2012), where the intention to do good was clear, but the result was the opposite of that intended.

7. Conclusion

This case highlights how DT can be used to influence students' mindsets to have a more holistic approach to creating innovative solutions. The case study examined how combining systems thinking, DT and sustainability could be used to shift students mindsets towards generating outcomes that would positively impact their local environment.

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Business Model Innovation in Emerging Industries: A Taxonomy of Space Economy Startups

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Abstract: Despite the inner interest of humankind toward space exploration, space business has been for a long time a matter for public institutions and space agencies only, mainly due to the strict regulations put in place and its inner technological complexity. This equilibrium has been changed in the last years because of a number of historical novelties, in particular because of revolutionary changes at the regulatory level and a continuous advancement for a technological perspective, lowering the main barriers to access the industry. These recent changes are redesigning the boundaries of the traditional space industry, today more broadly renamed as Space Economy and considered "the final economic frontier". With an estimated multi-trillion value in the next two decades, a large of number of entrepreneurial ventures have been recently established to grasp the different market opportunities risen. Because of the innovative nature of startups, often the first vehicle of novelty, we have conducted a first analysis on the business models implemented by these new Space Economy startups. Scholars devoted attention to business model in the last two decades because of its versatility and generalizability, and it is today largely accepted in academia as the representation of the firm's value architecture and the implementation of the firm's realized strategy. Building on prior literature of space, we defined a number of business model building blocks to introduce in our analysis, theoretically linked with the established mechanisms of value creation, value delivery and value capture from business model theory. We created a proprietary database of Space Economy startups, thus collecting data about their business model from both primary and secondary sources. We then present a taxonomy of six business model archetypes for these innovative startups operating in the Space Economy domain, classified according to their value proposition and target markets. Both scholars and practitioner may gain relevant insights from this study, with a first taxonomy of business models in an emerging industry originated from a transformation of the prior configuration and the most common architecture implemented in a fast-growing market that may suggest guidelines for private investments and new economic growth policies.

Keywords: space economy, space industry, business model innovation, emerging industries, startup

1. Introduction

In the last years, the increased demand for space enabled product and services from institutional and private customers, enabled by deep changes at the regulatory and technological level, gave birth to what is now called Space Economy (Weinzierl, 2019). Going beyond the traditional boundaries of the space industry, it is characterized by the combination of space resources with other kind of data and technologies, in particular digital ones. According to Morgan Stanley, this new space era will bring many business opportunities, with cross-industry effects in a variety of sectors, with a potential value of a "multi-trillion" economy by 2040.

According to the theory of industry life cycle, the different stages of an industry are usually marked by some events (Peltoniemi, 2011). Specifically, the periods of emergence and growth of a new industry, that can be originated both from scratch and from a transformation of an existing competitive environment, often experience the massive entry of new firms, especially new ventures built around the new entrepreneurial opportunities arisen. Recent literature has devoted large attention to the study of the business model, commonly defined as the way in which the firm creates value for the customer, and then delivers and converts this value into profit (Teece, 2010). Widely considered the firm's realized strategy (Casadesus-Masanell & Ricart, 2010), the business model is often the vehicle through which new ventures show their potential through a variety of stakeholders, from possible investors to prospect customers. Defining viable business model becomes thus fundamental in the early stage of activities of new ventures, especially in competitive arenas where a dominant design in terms of value mechanisms have not been consolidated yet (Santos & Eisenhardt, 2009).

This study provides a taxonomy of the most common business models designed by Space Economy startups in these first years of activities. Through a worldwide census of the Space Economy startups, followed by a deep collection of information from secondary sources and a direct survey to them, we derive six business model archetypes classified according to the dimensions of *value proposition* and *target customer*. We discuss the commonalities and the differences within and across archetypes, offering useful insights for both scholars

studying business model in new industries, as well as for entrepreneurs and investors – present and potential – willing to tackle this new business opportunity.

The paper is structured as followed: Section 2 provides the conceptual background of the study, while Section 3 presents data and methods employed in the research. Sections 4 presents the results of the study that are discussed in Section 5. We conclude with general recommendations about future research and possible areas of improvement for the actual research.

2. Literature review

Business model - The concept of business model started gaining momentum at the end of nineties and in the first years of the new century, tightly linked to the new era of the e-business. Indeed, Amit and Zott (2001) present the business model concept as the "content, structure and governance of transactions designed so as to create value", made necessary because of the limited ability of traditional strategic models to explain the creation of value in the new digital world.

However, because of its versatility and generalizability, the business model has gone beyond the boundaries of the IT and digital industries in which it was originally conceptualized (Magretta, 2002). Today, it is widely defined as the way in which the firm creates value, delivers, and converts this value into profit, thus representing the firm's realized strategy (Casedesus-Masanell & Ricart, 2010; Teece, 2010). Despite the large attention received in academia, the success has been remarked in the managerial community too. This has been possible through the conceptualization of the "business model canvas" (Osterwalder & Pigneur, 2010), an immediate and easy-to-ready framework divided into nine building blocks, referred to the main theoretical dimensions of value creation, value delivery and value capture (Täuscher et al, 2016). The same authors in their book provide different taxonomies of business models, shedding further light on its use to represent commonalities and differences among firms in a more abstracted view. Indeed, since the beginning scholars have been conceptualizing business model archetypes from a multitude of different perspectives, from theoretical standpoints such as the relational-view to the more industry-specific taxonomies such as the eleven-e-commerce configurations presented by Timmers (1998).

One of the common strengths of the business model is represented by the capability to capture the essence of new ventures' strategies. Indeed, most of the models conceptualized before the e-business were mainly addressed to represent the creation of value into established firms (Amit & Zott, 2001). The large number of new firms established during the dot-com era posed relevant challenges to traditional strategic management, until the point that today new ventures and startups embed the notion of business model in their own definition, being temporary organizations formed to search for a repeatable and scalable business model (Blank, 2010).

Emerging Industries and Space Economy - Prior literature defined an emerging industry as a "business environment in an early stage of formation" (Santos & Eisenhardt, 2009) that may be composed of *de alio* (i.e., established ventures from other industries) and/or *de novo* (i.e., entrepreneurial startups) firms. The birth of an emerging industry may be initiated by different events, such as technological developments, changes in cultural values or changes in the regulatory environment, often followed by a massive entry of new players willing to grasp the potentialities of the new business opportunities derived (Gustafson et al., 2016). Later stages of the cycle are the *co-evolutionary stage*, with a convergence toward a dominant design embedding the crystallized stakeholders' needs, and the first solid collaborations between firms and institutional actors. Then, in the *growth stage*, technological and product standards are defined, and the industry usually experience a take-off in terms of overall sales.

The transformation of the space industry into the Space Economy is an example of an emergent industry born due to regulatory changes (i.e., liberalization of space launching activities in 2015), followed by the entry of new competitors and the creation of space agencies which partner with companies to spur space development (Weinzierl, 2019; Denis et al., 2020).

The players competing into the Space Economy tend to be divided into upstream and downstream, according to their main activities (Lamine et al., 2021). Upstream players are partially overlapped with traditional space industry actors, with value propositions concerning the manufacturing of spatial assets (i.e., satellites, launch vehicles or ground stations) and the related services (i.e., launch operations, antennas management) that usually

require relevant capital expenditures in the early stages. Downstream is rather characterized by the exploitation of data collected from the space asset managed by the upstream, often combined with other sources of data, especially of digital nature. This segment represents the real novelty of the Space Economy compared to the traditional space industry. Beyond private companies, there are other external actors playing a relevant role in the industry. An example is represented by *space agencies*, the operative institutional bodies through which governments pursued their space activities, from the historical space exploration to the recent space commercialization.

The current development of the Space Economy led some authors paying attention to the phenomena from a business perspective. Denis and colleagues (2020) propose a first taxonomy of space players in the new domain, outlining five configurations: *going to space*, *new horizons*, *space meccano*, *space for space* and *down to earth*. This taxonomy offers relevant insights in relation to the direction of the whole Space Economy because based on its current trends. At the same time, it remains at higher level compared to the possible analysis of the specific firms really competing there.

This is the reason why we decided to look at the Space Economy ecosystem from a business model perspective, keeping a focus on the innovative side of the phenomena investigating for possible common archetypes within the new ventures which have recently tackled this new business opportunity.

3. Data and methods

The purpose of the study has been to be the most comprehensive possible in relation to the different kind of Space Economy startups to include in the analysis. With this aim, we firstly conducted a worldwide census of Space Economy startups, a procedure commonly consisting into enumerating, collecting and recording information about the members of a given population. Other scholars started from industry-specific census to lately study phenomenon, as done by Truant and colleagues (2019) regarding the organic business model of companies in the Italian bio-district sector.

We created a database of 735 startups belonging to the Space Economy, selected according to specific keywords derived from different worldwide famous startups widely recognized as players belonging to the Space Economy. Data have been extracted from Crunchbase and Pitchbook, sources recognized reliable and already employed in numerous scientific research (Cumming & Zhang, 2019; Fuchs et al, 2019). With the aim to keep into consideration the most promising startups, we included those new ventures which had an active operative status, founded after 2010. Literature on startups has an open debate concerning the timespan to consider a firm a startup, with most of the studies using the threshold of five years, eventually extended to ten years in case of capital-intensive industries (e.g., biotech). Being the Space Economy highly characterized by capital expenditures that may require more time for startups to really turn on their service on the market, we keep a ten-year lifespan (Ewens et al., 2020). Then, according to the signaling theory, we included only those startups that have received at least one investment round in the last five years (i.e., from 2015 included). This allowed us to keep into consideration only new ventures that have already received a first positive signal of quality from the market. These selection criteria represented the first search in the different databases, then each startup description has been manually analysed and cross-checked with the proprietary website.

Based on the contact information on Pitchbook, Crunchbase and on the startups website, we sent an invitation to fulfil an online survey regarding their business model. The survey was mainly structured through multiple-choices across the nine-blocks of the business model canvas. For instance, in the section of key partnerships (which have clearly distinguished from target customers), respondents were asked to highlight if they had relationships with space industry players (differentiated between incumbents and other startups), government and institutions, space agencies, incubators and accelerators, or professional investing fund. Moreover, a blank space was inserted to allow them to specify other possibilities we could have omitted. This has been repeated for all the sections of the business model canvas, thus resulting in a dummy-variable dataset of responses. Among the 735 startups included into our selection, we had an active email address of only 364 startups to which the survey has been sent. With a first send and a reminder two weeks later, we received 52 responses (14,2%).

3.1 Data analysis

Once the whole database has been built and uniformed, we qualitatively analysed the data collected in order to identify the most relevant variables according to which crafting a possible discrimination among the different startups business model. Indeed, being the dataset of responses mainly based on dummy variables, any quantitative clustering method – such as the k-means algorithm - could not have been applied effectively (Han et al., 2012).

Literature presents different examples of taxonomies derived through a qualitative approach, usually through the definition of two or more dimensions that serve as discriminator among the different observations. For instance, Bohnsack and colleagues (2014) derived a taxonomy of the business model in the emerging electric vehicles industry, based on value proposition, value network and revenue-cost model.

In our case of Space Economy startups, we identified as main dimensions the *tangibility* of the value proposition, meaning how much it is related to a manufacturing-oriented offer or a service-based one, consistent with the literature of servitization. According to Mastrogiacomo and colleagues (2020) we grouped the different responses into three main values: pure *product*, pure *service,* and the intermediate *bundle product-service*.

The second dimension identified as discriminant has been the *target market*. According to Graziola (2018), to produce the final space products FSPs and the final products for the end-users, a relevant number of actors is involved that offer products and services to both space firms and non-space firms. Therefore, we decided to define the two possible values of *space industry* and the *other industries* in terms of target market.

4. Results

Based on the two dimensions identified (i.e., *value proposition tangibility*, *target market*) we have been able to depict six business model archetypes, represented in Figure 1.

Figure 1: Business model configurations in the space economy [original elaboration]

Configuration 1 - Generic providers: it includes companies which patented products are not offered only to the space industry, but also to a large plethora of industries, such as healthcare and water treatment. 2 sub-groups have been identified in this cluster: the first is the hardware and software *providers (HW/SW)* offering GPS receivers, anti-jamming software and hardware, geospatial software, and printed circuit boards, and the second is the *material* group, developing carbon and nanomaterials used in the manufacturing process of the different mechanical and non-mechanical components. These types of companies sell their products only to international B2B customers through a dedicated internal sales force.

Configuration 2 - Space providers: shows a similar structure of *Generic providers*, with the exception to include startups serving only the space industry. Indeed, the product offering comprehends propulsion systems, software control systems, antennas (among the others). In this case, the customers are also the space agencies, and in minor percentage, governmental institutions, but always with a space-orientation.

Configuration 3 - Become an astronaut: This cluster is characterized from the offer of satellite turnkey solutions, encompassing the manufacturing of satellites and the related ground terminals, as well as consulting services and mission management. Customers are international and extremely diversified all along the space domain,

from companies to governments, to space agencies. These startups usually sign contract with their customers through their internal salesforce in a long-term co-creation relationship.

Configuration 4 - Space supporters: startups belonging to this group offer pure service targeting the space industry, such as satellite launch services, in-space operations (e.g., EOL disposal, in-space transportation, in-orbit servicing), and space support services (e.g., consulting, insurance). This type of companies targets all the space customers segments through the internal salesforce and are usually founded and operated by people with prior experience in the space industry.

Configuration 5 - Big brother: this group of startups is characterized by an extensive use of all the enabling technologies that makes the space industry able to deliver its services to vertical markets (e.g., artificial intelligence). With the group "Space at your disposal", it represents the most common interface with end-users, marking the real innovation of the Space Economy. Within this cluster it was possible to identify two distinct sub-groups. The first is the *telematics* cluster, which comprehends startups leveraging GPS technology to offer API platforms that integrates the location with other sources of data to generate decisional dashboards. This sub-group serve only customers in the B2B segment, usually in the transportation and the logistics industries.

The second sub-group is the *earth observation* one, leveraging remote sensing technologies to gather earth images lately combined with machine learning and artificial intelligence algorithms to devise valuable insights. Within this sub-group, it is possible to identify more *integrated* companies that use proprietary satellites, and *agile* companies buying the images from suppliers and focus on the application and derivation of insights only.

Configuration 6 - Space at your disposal: This group includes startups offering pure services to business customers, governments, and partly B2C, such as satellite communications providers, players offering satellite infrastructure as-a-service and cloud storage, or individuals with IoT devices leveraging on space signals. These startups operate with their own constellation of satellites to deliver their offering to their international customer segments, usually employing outsourced channel with the support of the sales force.

5. Discussion

The taxonomy of six business model configurations and their related sub-groups offers relevant insights with particular reference to previous studies that introduced other configurations in the recent past.

The variables *value proposition tangibility* and *target market* utilized to craft the taxonomy allowed not only to draw clear boundaries between the different clusters, but especially as relevant elements to position the archetypes themselves along the Space Economy value chain. The first variable is consistent with use of the value proposition in prior studies about the space ecosystem and its business models (Orlova et al, 2020; Denis et al, 2020). From the business model configurations, it is possible to observe that the value proposition seems to be one of the most important variables in discriminating between them (thus not implying that there is one type of business model for a defined value proposition). The second variable, *target market,* has been able to address the complexity of the internal dynamics of the value chain (Graziola, 2018) and the numerous vertical industries that are increasingly leveraging space enabled products and services (Alvino et al, 2019).

From the business model configurations emerge further support to recent Space Economy literature. Firstly, it is clear the transition of the industry players from an institutional target only, to mix of public and private customers. Indeed, only the "Telematics" and "Agile" archetypes serve only B2B segments, whereas the others have mixed customers segments. Another element of interest is the frequency of intra-industry partnerships (i.e., among space players), that may suggest that partnerships had (and still have) an important role in the commercialization of space because of the established firms' necessity to innovate the offer through more flexible vehicles as startups can be.

However, the most interesting elements to be discussed are represented by the commonalities among the different business model archetypes.

Internationalization – The taxonomy shows how the majority of the startups serve customer worldwide since the beginning. This suggests that these new ventures from the foundation are aiming at international markets. This is coherent with the recent theory of born globals which often leverage digital technologies and offer

services (Hennart, 2014), in contrast with the most traditional internationalization theories conceptualized in the seventies, which saw the expansion abroad as "a series of incremental decisions" (Johanson & Vahlne, 1977). It could be noticed how the Space Economy favours this kind of approach since the beginning, because of the high possibilities in terms of partnerships (Cahen et al, 2017). From the other side, being highly capital intensive and mainly based on B2B markets, the internationalization since the beginning could be interpreted as a requirement and not as a choice, with the aim to tackle a larger customer base and thus sharing the initial fixed costs, allowing also better offerings in terms of pricing.

Prior experience in the space industry - The majority of the startups analysed have been established by one or more founders with prior experience in the space industry, coherent with prior studies showing how knowledge of founders is positively linked to survival and long-term performances of new ventures (Dencker et al, 2009). Looking at the startups analyzed, it may be noticed how also employees with prior experience in space ventures is a common characteristic. Analogously to what already introduced concerning founders, also employees with space skills and prior industry experience represent a key element in Space Economy startups. Prior space literature highlights a positive link between knowledge management and positive organizational performance as the absorbed knowledge and processes enable the transformation of space resources in product and services that are valuable for the market (Olla et al, 2006).

One-to-One deal and Sales force - From the business model configurations, the majority of companies are structured around one-to-one deal with of potential customers, with the establishment of co-creation relationships in some cases. In carrying out these customer relationships, space startups often use the internal sales force, recognized as a major contributor in new product/services success (Hultink et al, 2000). The choice of this types of relationships to deliver the value proposition depends on the targeted market. Products and services targeting the space industry are inherently complex, and startups leverage internal personnel. The value proposition offered to vertical industries require instead a more educational activity regarding the newness of the proposition. Therefore, the internal sales force is in charge to make end-users aware about the advantages that they may leverage empowering such innovative space-based offerings. Probably because of the difference in terms of capillarity compared to space-oriented offerings, startups targeting other industries employ also outsourced channels (e.g., wholesalers or distribution partners) to complement their sales force.

Exhibitions and fairs - The last common characteristic among the archetypes is the use of exhibitions and fairs as main communication channel. These are highly technical events where a relevant number of industry players participate to show their new products and innovation, or as crowd to evaluate new technologies (Kalafsky & Gress, 2013). For entrepreneurial ventures, the participation to trade fairs has been identified as one of the most effective methods to promote innovation and networking with other companies (Antolin-Lopez et al, 2015). A specific remark has to be made for the channel enabled by space agencies. Compared to the previous alternatives that mainly have a commercial scope, this type of channel favours the divulgation of startups activities through the publication of industry research and business cases, as well articles oriented to the managerial community.

Apart from the taxonomy, a final element of interest is undoubtedly related to the ownership of the satellites to collect data. For instance, beyond the two sub-archetypes of agile and integrated, show relevant consequences on the value mechanisms of the startups. An integrated archetype means higher capital expenditure at the beginning but the possibility to have a primary control on data quality and the margin to diversify its use. Conversely, agile archetypes which acquire data from third parties can maintain lower costs, but they have to rely on the quality offered by the market. These two alternative configurations enrich the debate related to make-or-buy decisions and the considerations that firms, and especially startups in the early stage of their activities, do about the trade-off between cost expenditure and data quality.

6. Conclusions

Despite the inclusivity we pursued in the selection of the startups sampled, the study is not free of limitations. For instance, other databases beyond Crunchbase and Pitchbook may have been accessed. Our decision to consider only startups which have received at least one financing round in the last five years may have constrained the selection, leaving out some interesting realities in the more embryonic phases. The final number of startups analysed could been improved in the future with other contact methods, such as social medias.

Archetypes can be further enriched by the inclusion of financial data, shedding light on the particular mechanisms of value capture.

However, we think that this research offers relevant insights to a large audience. Scholars in strategic entrepreneurship may be interested in one of the first taxonomy of an emerging ecosystem such as the one of the Space Economy, deriving actionable insights on the design of business modes in context of high uncertainty. Entrepreneurs and managers both within and outside the space domain may find of interest the study because of possible entrepreneurial ideas to launch, as valuable benchmark in a first competitive analysis. Finally, policymakers may have interest in depicting the most promising archetypes in terms of general economic development, to further support with possible policy interventions.

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Business Model Validation in Emerging Industries: Evidence From Space Economy Startups

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Abstract: In the last decade, both scholars and practitioners have devoted attention to the increased wave of digitalization that pervasively tackled the majority of the existing industries and, in some cases, created entirely new competitive arenas. The common trait of this digitalization trend has often been the proposition of innovative business models by startups, challenging the status-quo shaking the rules of competition. However, because of their liability of newness, these new ventures face the issue to convince the market about the quality of their whole offer. With this aim, recent literature of entrepreneurship grew significantly around the concept of business model validation, in particular through experimental approaches generally known as lean startup approaches. Despite their popularity to mitigate the uncertainty related to fast-changing environments, little is known about their application in the extreme context of uncertainty: emerging industries. Through a multiple case-study, this research seeks to contribute to this gap, studying how startups in the New Space Economy tackled the emerging industry originated from deep technological and regulatory changes in the traditional space industry, specifically investigating how they pursued their process of business model validation in such kind of context.

Keywords: business model validation, lean startup approaches, startup, space economy, business model innovation

1. Introduction

Recent literature in strategy and entrepreneurship has increasingly investigated processes through which both established firms and new venture introduce novelties in the market, often introducing business model innovation (Teece, 2010; Demil et al., 2015; Foss & Saebi, 2017). Research shed light regarding the experimental approaches new players employ in validating their new business models, extremely customer-centric in collecting direct feedback from the market and iteratively adjusting the value mechanisms associated, practices taking the broad name of lean startup approaches (Ghezzi and Cavallo, 2020). Despite the attention devoted to the topic, little has been done with reference to the specific conditions under which these approaches take place. Originally developed to mitigate the high-uncertainty of the external environment and thus suggesting a learning behavior characterized by limited investments in the initial phases, no prior study investigated how the validation of a novel business model take place during the specific conditions of industry emergence. This study seeks to contribute to this research gap, looking at how startups pursue their business model validation process in emerging industries, thus including in the research the boundary conditions that have been often left out in previous studies in the field. The research has been conducted in the emerging context of the Space Economy, also known as New Space or Space 2.0., the new configuration of the traditional space industry that is taking place in the last years as reaction of new technological developments and deep regulatory changes, considered one of the most visible trends in Space in the 21st century (Weinzierl, 2019; Denis, et al., 2020). We conducted an exploratory multiple-case study based on ten new ventures of Space Economy, characterized by value propositions both similar to the traditional space industry and completely innovative in respect to the past, thus allowing to generalize the results.

We present a business model validation process peculiar of emerging industries, thus contributing to the literature of strategy and entrepreneurship, enriching the current debate shedding light on particular boundary conditions that represent source of uncertainty, the main hurdle that prior literature on the topic claimed to mitigate. The study thus provides useful guidelines for the policy-maker willing to evaluate and eventually improve the measure put in place in boosting the new emerging industry it has concurred to create. Finally, the research suggests to managers and entrepreneurs a possible process to pursue in validating the business model of their new venture in a contexts characterized by high asset-intensiveness and high uncertainty, as the one of Space Economy.

2. Theoretical background

Business Model and Business Model Validation - The business model concept is today widely employed in both academia and practice in a variety of managerial disciplines, from strategy and entrepreneurship to operations and supply chain management, logically intended as the atomic representation of a firm's realized strategy

(Casadesus-Masanell and Ricart, 2010; Bortolini et al., 2018). Despite the fragmentation in terms of definitions, the majority of the scholars tend to agree with the broad conceptualization of Teece (2010) who describes business model as the way the company creates and delivers value to customers and how to convert the payments received in profit. In the last years, relevant attention has been devoted to study the business model as locus of innovation itself, going beyond product and service innovations traditionally carried out by firms, thus introducing a debate in innovation management too (Zott et al., 2011; Amit & Zott, 2012). Recent literature is thus devoting increasing attention to business model validation processes in startups, from the most consolidated customer development and agile development to the latest lean startup and growth hacking, all generally going under the broader umbrella of "lean startup approaches", because of their commonly shared experimental and iterative nature (Ghezzi & Cavallo, 2020). These processes encompass a continuous interaction with the market, with the aim to learn and adjust the proposed innovation according to the feedback directly collected from the final customers (Euchner & Ganguly, 2014). Literature of business model validation has generally addressed the phenomena with the aim to mitigate the uncertainties related to fast-changing environments, often consequences of radical technological innovations or deep regulatory changes. However, no prior study addressed the issue in the context of new and emerging industry, definitely characterized by uncertainties because of its undefined boundaries (Santos & Eisenhardt, 2009).

New Industries Emergence – The concept of industry has always attracted a large attention from scholars especially studying the evolution and the life-cycles of different sectors through the strategic movements of firms competing there (Kim & Park, 2006; Peltoniemi, 2011). Despite the multitude perspectives adopted, today is generally accepted that a generic industry goes through different stages, even if there is still debate concerning the events determining the shift from one stage to another (Gustafson et al., 2016). Because of the potential implications on the general economic growth of nations, in the last years a number of studies devoted attention to the emergence of new industries and their inception or incubation phase, possibly arising from one or more triggers, such as technological breakthroughs or regulatory changes (Phaal et al., 2011; Lounsboury et al., 2003; Madhavan et al., 1998; Agarwal & Bayus, 2002). New industries tend to emerge by challenging an existing order, even without requiring that such changes have taken already place. A new industry emergence is thus characterized by a high fermentation, given possible lacks in the convergence of products and services offered, technologies employed and typology of industry members, with the boundaries of the competitive arena remaining consequently blurred and undefined (Forbes and Kirsch 2011; Phaal et al. 2011).

In their review, Gustafson and colleagues (2016) pointed out how prior literature fail to clearly distinguish between the industry emergence process and other peculiar processes associated to industry dynamics, such as industry transition, industry renewal or the creation of a new niche. Indeed, the concept of industry emergence tends to encompass all these other processes, since prior research highlight how a new industry can emerge both from an existing industry or from sketch. Despite the different terminologies employed, the common element among all these processes of industry dynamics is the high uncertainty characterizing the environment, thus posing relevant hurdles for firms competing there, especially the ones of recent foundation looking at the validation and legitimization of their core activities, in a context where no rules have been set at all (Santos & Eisenhardt, 2009).

This process of legitimization often coincides with the development of a viable business model that may serve externally signal quality to potential investors and customers with the aim to foster its activities and possibly scale the business (von Burg and Kenney, 2000).

3. Research methods

Our study seeks to elaborate theory concerning how new ventures pursue their process of business model validation in emerging industries, utilizing an in-depth multiple case study approach set in the Space Economy, aiming at identifying and interpreting the inner mechanisms of the phenomena under investigation (Yin, 1984; Eisenhardt, 1989). The methodology exploited for case studies has the aim of generalizing the findings of the study to create theory (Yin, 1984; Meredith, 1998) enabling a comparative analysis of the findings, because the theoretical sample can possibly include extreme cases, polar types or niche situations (Meredith, 1998).

In *Table 1*, the case sample and its heterogeneity variables are summarized.

Table 1: Case sampling

Startup Name	Space Segment	# Employees	Foundation year	Geographical HQ
D-Orbit	*Upstream*	*52*	*2011*	*Fino Monasco (Italy)*
Latitudo 40	*Downstream*	*8*	*2017*	*Napoli (Italy)*
IngeniArs	*Upstream*	*11*	*2014*	*Pisa (Italy)*
Nurjana Technologies	*Downstream*	*12*	*2012*	*Elmas (Italy)*
AIKO	*Upstream*	*7*	*2017*	*Torino (Italy)*
WeGaw	*Downstream*	*5*	*2016*	*Morges (Switzerland)*
CropSafe	*Downstream*	*6*	*2018*	*MagherafeIt (UK)*
StudioMapp	*Downstream*	*4*	*2015*	*Ravenna (Italy)*
Leaf Space	*Upstream*	*12*	*2014*	*Lomazzo (Italy)*
SPiN	*Upstream*	*6*	*2015*	*Darmstadt (Germany)*

Data Gathering - The primary source was semi-structured interviews. Face-to-face, semi-structured format interviews were exploited in order to tackle the key points of the objective of the investigation while leaving the interviewee to freely describe its experience. We conducted fourteen semi-structured interviews with the informants covering the role of founder or Chief Executive Officer of the startups, thus accounting for their primarily involvement in the process of business model validation of their own companies. As case studies rely heavily on the correctness of the information provided by the interviewees for their validity and reliability, and these can be enhanced by using multiple sources or "looking at data in multiple ways" (Eisenhardt, 1989; Yin, 2003), several secondary sources of evidence were also added to supplement the interview data. Materials about the sampled startups have been retrieved from the web and the press (e.g., official website, social media pages, specialized magazines) and in occasion of public events hosting the startups in the sample as guest speakers (e.g., webinar, workshops). *Table 2* presents a clear explanation of the sources of evidence adopted in the research.

Table 2: Data collection and sources

Data Type		Quantity	Original Data Source
Primary	Semi-structured interviews	1 Pilot interview	President of a VC Fund devoted to Space Economy
		14 in-depth interviews (D-Orbit, 2; Latitudo 40, 2; IngeniArs, 1; Nurjana Technologies, 1; AIKO, 1; WeGaw, 2; CropSafe, 1; Studiomapp, 2; Leaf Space, 1; SPiN, 1).	Informants (CEOs and co-founders)
	Informal emails	137 informal emails	Informants
Secondary	External documents and sources	47 internet pages	Company websites and social media pages, informants LinkedIn profiles
		4 live-events on Entrepreneurship on Space Economy	Speeches of some of the informants
		54 news articles	News outlets
		7 annual reports	AIDA (Analisi Informatizzata Delle Aziende Italiane)

Data Analysis - The responses from the interviewees were recorded and fully transcribed. Subsequently, following the recommendations of Eisenhardt (1989), a within-case data analysis was carried out to generate the necessary insight into the issues under scrutiny; a subsequent cross-case analysis allowed to make a comparison between the different responses given by the interviewees from the ten different startups. Interview content analysis was performed by borrowing the open coding practice from Grounded Theory methodology (Glaser & Strauss, 1967). Moreover, following Gioia and colleagues (2012), in vivo codes were transformed into aggregated concepts and the real-world content obtained from the qualitative interviews enabled to proceed with the abstraction and theory building in an inductive coding tree (Saldaña, 2009). Considering the cross-case analysis, a research of similarities and differences between the ten New Space Economy startups was carried out with reference to the first order concepts, second order themes and, above all, the overarching dimensions (Yin, 1984). This concluding procedure allowed to contrast and compare the business model validation process steps and constituent elements within the ten different startups under investigation, allowing to make the best use of multiple case study to "capture the novel findings that may appear in the data" (Eisenhardt, 1989).

Figure 1: Coding tree

4. Results

This exploratory multiple case study revealed findings concerning the business model validation process that Space Economy startups carry out. In order to extract a contribution from this research for theory and practice, the discussion will first treat each case alone, elaborating on each coding tree and thus the relative within-case findings. Subsequently, the cross-case analysis will lead to the formulation of a clarifying framework as well as a future research agenda.

4.1 Within-case findings

In *Table 3* the within-case findings are summarized. In particular for four of the ten cases under analysis, the dimensions that will be the main building block the business model validation process in the emerging industries are reported.

Table 3: Example of within-case findings

Startup Name	Opportunity Identification	Technology Development & Validation	Customer Identification & Value Proposition Design	Customer Validation	Integration
D-Orbit	Founders worked in the NASA Research Centre, noticing the trend of small satellites, space debris. Solution of problems like big launchers, redundant processes and long lead times.	Assembling technological solutions already validated by other players in an innovative way, to deliver a first prototype without huge investments and risks.	Leveraged prior space industry experience and the membership to an industry-specific national association, collecting feedback concerning the solution.	One-to-one relationship deep diving into the inherent needs of the customer, proving the technical feasibility of the solution and marginally adjusting the backbone solution according to the specifications.	Co-development with the customer, with access to the whole information to fully customize the solution on its requirements.
Latitudo 40	Twenty years of experience in the space industry. Seek and find an unexpressed need of customer in EO.	Creation of a demo software with Open Source data and based on the co-founder IT background.	Prior experience in the industry but also social media and business tools to identify customers, then showing the demo solution to improve and then design the final value proposition.	Once three customers of the same industry segment (e.g., energy) specify needs that are technically feasible, the startup validates the customer segment. Otherwise, there is a pivot on another customer segment.	Connection with the customer server with our cloud system, then the solution is ready to use.
IngeniArs	Know-how and skills coming from the university. One co-founder worked in ESA for twelve years. Typical case of technology transfer from the university to the industrial environment	Followed the standard provided at European level for space activities, joining a public call issued by ESA to develop a technological solution.	Leveraged prior experience in the space industry and the ESA network to identify potential customers, showing them the basic solution to collect feedback and refine the value proposition.		Strongly based on co-development. In the moment in which the customer has signed the contract, it will provide access to its information and there always integration issues that should be fixed together.
Nurjana Technologies	Fifteen years of experience in the Aerospace and Defence sector Solve customers' operational problems being a small-scale integrator with a high degree of flexibility	Leverage prior experience in the field to join a public call issued by ESA to develop a technological solution.	Leveraged prior experience in the space industry and ESA network to identify potential customers, the former element allowed to design a value proposition with a high-level of acceptance.	The deep knowledge of the founders concerning the space industry allowed the startup to address a clear need of the customers. To some extent, the customer validation was already achieved at the beginning.	Realization of the final solution, monitoring the use by the customer to bring updates at regular time intervals or specific request.

4.2 Cross-case findings

Following the within-case analysis, a cross-case analysis was conducted to make commonalities and differences among the cases emerge.

Opportunity Identification - In first stance, because of the emerging phase of the industry under investigation, all the startups have highlighted how they actually identified the business opportunity surrounding their inception. The players positioned in the part of the industry closer to the previous configuration of the Space Economy (i.e., upstream) pointed out how previous experience in the sector was fundamental to this extent. In the downstream the results are slightly different. Here founders did not have any background in space disciplines or experience in the previous industry, rather they are mainly software developers who discovered the opportunity to plug space data in advanced algorithms, offering decision-making support dashboards. The lack

of prior experience in the field to spot possible opportunities is often mitigated by public institutions which organized events to educate people about the potentialities of space data, as different informants reported.

Once identified the business opportunity, there is fully coherence in the cases to develop a first version of the solution. However, depending on the cases, it can happen concurrently or a little bit after approaching the market in order to assess whether a customer actually exists.

Technology Development – In the upstream, the first development activity tends to be performed internally, realizing prototypes or MVPs. It seems shared the belief that in the first phase of the technological development the main direction relies in assembling solutions made of other parts already validated before, to lower down the risk and capital expenditure associated. The same pattern emerges from downstream players, whose value propositions rely more in solutions close to the software world than the traditional space. The first versions tend to be developed totally internally by the founding team, leveraging on prior coding skills, adding space novelties acquired through the attendance of external seminars carried out institutions.

Technology Validation - Once the technology has been developed, startups look for the validation of their solution with the aim to later sell it on the market. Considering the upstream segment, given the fact that the new technology and the related product have to fly into orbit, it is recommendable to obtain some kind of certification of reliability. In particular, specific tests should be performed in order to state its robustness, trustworthiness and safety. Different is the situation in the downstream, where there is the shared experience to apply (and win) public calls for funding and idea development, concurrently driving an additional visibility from potential customers, through the press coverage and possibility to exhibit a worldwide recognizable logo on their website, both working as signals for the markets. As a result, institutions and public entities may play a major role not only from a technological and technical point of view, but also in the first step toward the commercialization.

Customer Identification - Concurrently or a little bit later having tackled the technological aspects, startup begin to deal with the commercial part, thus looking at potential customers and the interaction with them. As in the previous phases of the process, prior founder's experience in the previous industry configuration results to help in this activity to get in touch with potential customers. Moreover, institutions may be a valuable source of building contacts and relationships with potential customers. Programs and calls sponsored by public entities can be exploited not only from a technological point of view but also from a commercial one, in order to be known in the market.

Value Proposition Design - The identification of the potential interested customers is followed by the direct interaction with them with the aim to understand their requirements and their inner needs. Given the complexity of the market and the B2B nature, this process is often pursued through a one-to-one interaction with the customer, in the case of the downstream concurrently with the already discussed phases of technology development and validation. Being today an emerging B2B market, this phase requires an additional step, with a deep dialogue with the single customer to adapt the solutions to its main requirements, often leading to co-development of the final solution. We refer to this phase as customer validation.

Customer validation - Differently from the previous phase of customer identification, here the conversation with the customer usually becomes a technical discussion that drives the customer company to order a pilot project with the customer identified, usually requiring a partial modification of the previous technology developed to meet the specific customer requirements. Therefore, the proof-of-concept building is an important element for the customer as it allows to completely understand the value that the new technology can bring.

Summing up, understanding the specific customers' needs and requirements, and setting the modifications to the basic technology to satisfy them is a crucial step for those startups. This is actually done through pilot projects, demos or proof-of-concepts carried out with a one-to-one conversation with the specific customer. Thus, the company is able to receive feedback from the client and, in case, it can adjust the technology accordingly. It must be noted that, if there is no match between the requirements of the specific customer and the technology, the solution validation is not obtained. Hence, the startup probably tries to engage another customer and begin all the conversations with the new client in order to understand its specific needs and requirements. In this context, the pivot is done on the customer and not on the technology that represents an achieved step. Indeed, developing a new technology and validating it, especially in the upstream segment is very

time demanding and complex. Therefore, the technology cannot be extremely modified; thus, leading the pivoting on the customer side.

Once achieved the solution validation, the integration phase begins. Indeed, the new technology and product offered by the Space company is integrated into the client venture and therefore, its existing technologies and components. The process of integration is extremely linked to the concept of customization. Indeed, the needs and the single customer's requirements are different. Hence, the startup has to understand the needs and after noticing that the proposed technology can satisfy them, the integration process begins delivering a tailor-made solution. As a matter of fact, the technology previously developed is quite basic and should be then customized according to the specific needs of the client. Moreover, it is worth underlining, that usually the customization is more expensive for upstream companies rather than for the downstream ones, even if it should always be done. The reason lies in the characterization and complexity of the product, being so difficult to realize, so complex and so time and resource consuming. It can happen that in the upstream the customization is more pervasive and so the development of the product, that will be sold to a specific customer, happens directly in collaboration with that client. Thus, leading to an ad-hoc solution.

In the light of the analysis and description of each phase, the business model validation process in emerging industries is proposed in *Figure 2*.

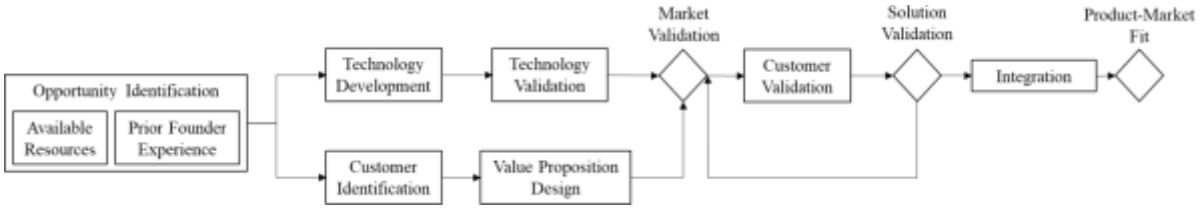

Figure 2: Business model validation process in emerging industries

5. Discussion

All along the model we conceptualized, the prior industry experience of the startup founder covers a relevant role, from the ability to identify the business opportunity in the new emerging industry to the other aspects related to customer involvement, exploiting possible networks of existing relationships to spread the solution. This suggest how emerging industries that come from transformations or renewal of a previous configuration are not independent, but rather what has been developed in the past still remains a valuable resource – mainly intangible – in the new context, thus leading to relevant advantages in the new activities (Hsu, 2007; Zhang, 2011). However, the study highlights also how the lack of previous experience can be mitigated by the role of institutions, as in the form of governmental programs and university support, spreading the knowledge concerning the new business opportunities coming from the emerging industry stage but also providing public funding and educational aid to start tackle the new environment. This enriches the debate opened by Alvarez and Barney (2007) concerning the origins of opportunity identification, contraposing the discovery theory and creation one. The present study shows how the experience of the entrepreneur in the previous industry configuration can represent a fundamental element in the ability to grasp hidden opportunities, as well as the intervention of public institutions may support other entrepreneurs without industry-specific experience in reasoning about the possible areas in which developing new businesses, once got in contact with the needed resources. This is also consistent with the consolidated literature which considers public bodies central in fostering entrepreneurship, specifically through the use of public funding (Doblinger et al., 2019), even more required when the emerging phase of the industry has been incepted also by regulatory changes (Madsen & Walker, 2007).

Concerning the process of business model validation itself, the research highlights that even in asset-intensive contexts such as the Space Economy, the nature of the process tend to be experimental, with a development of the solution in different interrelated stages in which the interaction with the external environment is fundamental in pursuing the final product-market fit, as suggested by the broad category of the Lean Startup Approaches, going well beyond the digital world where they have been originally conceptualized (Ghezzi & Cavallo, 2020; Trimi & Berbegal-Mirabent, 2012). However, it highlights also some differences related to the particular context. Indeed, nevertheless the development of an MVP to initially show the solution to the customer, this is not always subject to major changes, mainly attributable to the asset intensiveness of the

solution itself, requiring some investments since the beginning. In order to reduce these investments, some startups rely on the assembly of different validated technologies in a new form to craft out their solution, suggesting how a connection between lean startup approaches and entrepreneurial bricolage may be particularly centered in this kind of environments (Baker & Nelson, 2005).

The main element of interest is represented by the way in which startups tackling these environments pivot their business model. Indeed, in the case the request for modifications collected during the market interaction require too many changes to the existing solution embedded in the MVP, the pivot is mainly done on the customer rather than on the solution itself. This suggests again how the context of asset-intensiveness require some modifications compared to what have been conceptualized before in terms of lean startup approaches, because of the inability to recover possible sunk cost previously bear in developing the first version of the solution. Moreover, it poses some challenges to the rooted role of the customer in the process, mainly considered central in providing feedback to adjust the solution according to their needs and to finally creating something that meets the favor of the market. This might be partially conditioned also by the nature of the emerging industry originated from a transformation rather than a de-novo industry at all. Indeed, since startups in this context often rely on founders with prior experience in the previous life of the industry, they may rely on a higher ability to isolate the feedback useful for the general improvement of the solution not completely following the adaptations suggested by the customer.

6. Conclusions

This case study is not free from limitations. Given the exploratory nature of the research can be affected by different kinds of subjectivity. Consequently, results may be partially biased from the interviewer's interpretation or even the interviewee may not have understood the questions correctly leading to a distortion of the final results (Yin, 1984). The decision to employ the methodology proposed by Gioia et al. (2012) has been taken to mitigate this issue, adding rigor to the qualitative research and enhancing the validity of the study. Nevertheless, future research could quantitatively study how New Space Economy startups conduct business model validation understanding which is the most used methodology. The outcome of the research is a new model for validation that contributes to theory and practice in several aspects.

From a theoretical point of view, the findings extend the notion of business model validation. They exhibit that New Space Economy startups follow a peculiar process when it comes to enter the Space sector and therefore validate their business models. The phases and peculiarities of this process are recognized, confirming some of the elements already pointed out by the broader category of the lean startup approaches, as well shedding light on possible differences that deserve further investigation. In terms of contributions to practice, the study suggests a possible order about the steps a startup in similar context may carry out. Policymakers may be interested in the study too, with the aim to gain insights concerning their programs to foster entrepreneurship.

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Entrepreneurial Alertness in Different Generations

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Abstract: Under COVID 19 environment it is important to analyse if there are differences between generations (X, Y, Z) within the context of entrepreneurial alertness (EA), and its influence in the creation of a new business. This study used a quantitative methodology trough a survey by questionnaire based on a sample of 978 people organized by age groups. We used, an exploratory factor analysis with principal components and varimax rotation, a one-way analysis of variance (ANOVA) by Tamhane Test and a linear regression model. An exploratory factor analysis is presented, to assess the dimensions of the entrepreneurial alertness from which two factors were obtained: the competence of processing information and establish connections to assure a profitable business (F1) and the capability of searching information and acknowledging opportunities (F2). Then, were applied one-way ANOVA and a linear regression model to compare different generations in relation with EA, and its relation to create a new business. The results demonstrate that generation Z has less propensity than generation Y in respect to F2. Besides F1 has the same importance for all generations. We found either, that the X generation has lower propension to start a new business. Testing the effects of different dimensions of EA, through a linear regression, with the propensity to develop a new business, we confirm that only F1 is significative while F2 is partial rejected. This research contributes to the field by demonstrating how different generations assign distinct relevance to entrepreneurial alertness dimensions and its importance to promote a new activity.

Keywords: alertness, generations, opportunities, entrepreneurship

1. Introduction

The term generation has been used in a variety of fields, namely, to assess differences between groups (Srinivasen 2012; Gonçalves 2015), especially their stereotypes (Stein 2013). Although there has been great enthusiasm in recent years, there is little evidence of existing generational differences. The generation concept to be used is reserved for age groups that lived in a certain time space (Mannheim 1952) configuring certain characteristics of life (Rayani 2015). In this line, it is understood that each socioeconomic environment shapes and conditions shared behaviours, giving characteristics to each new generation (Kupperschmidt 2000; Rudolph et al, 2017) in terms of attitudes, beliefs, and expectations. According to Ensari (2017), this establishes a generational typology distinguishing the silent generation, the baby boomers, the generation X, Y and Z. Each generation is distinguished according to the ways in which they face work, authority, expectations about the development of their professional careers, and the way they relate and connect with technology. Entrepreneurship studies evolved from a focus on personality characteristics (Borg & Shapiro 1996; Stewart et al, 1998), to a set of studies focused on demographic differences (Kalleberg & Leicht 1991; Mattews & Moser 1996). The differences found in entrepreneurial skills were not always evident. More recently, new studies can be found around cultural and generational variables (Mueller 2004; Wilson et al, 2007; Malach et al, 2010; Shinnar et al, 2012). The conclusions related to the differences among genders have showed mixed results. This opinion of generational differences has been more recently developed by Rudolph and Zacher (2017, 2018, 2020) who seek to highlight the myths and ambiguities surrounding the concept, proposing a constructionist approach to life perspectives, thus allowing a better interpretation of generation differences.

The study of Tang et al (2012) tried to understand how the alertness factor can allow the recognition of opportunities. In this sequence, the author points out some characteristics that the entrepreneur must have, namely the search for information, the association and connections between the information and, lastly, the ability to evaluate the opportunities.

The article intends to establish a relationship between the propensity of different generations, with the different dimensions of alertness, and the consequent probability of starting a new activity. Subsequently, the procedures used in the collection and processing of data are described. The results obtained were based on statistical techniques of exploratory factor analyses, a one-way ANOVA, and a linear regression model. In the final part, the conclusions, and limitations are also presented.

2. Literature revision

2.1.1 Generations

The main theoretical approaches are divided into different perspectives. According to the Theory of Generations, the social forces and events of a given time give rise to collective memories that may interfere with future attitudes and behaviours (Joshi et al, 2011). Statnicke (276: 2019) states that 'from this perspective, a generation is a mechanism, by means of which the individual understands his / her life in a historical context and interprets the behaviour of others'. Lyons and Karon (2014) posits that these collective memories of the initial events of each generation may determine future attitudes and behaviours. A different approach is carried out by Howe and Strauss (1991) according to which the 'generation is a social force facilitating the transfer of new ideas and social science'. Demographic cohorts are crucial to characterize and identify patterns in people who were born in the same historical and cultural periods (Foster 2013; Lyon and Kuron 2014). The different generations are thus defined as having different common cultural habits – emotions, attitudes, leisure activities, fashion and music trends, or technological influences (Bourdien 1993; McMullin et al, 2007). According to Howe and Strauss (1991), generations adopt different behavioural patterns in twenty years cycles, and after the fourth cycle the latter approaches the first. It is this approach that differentiates it from the previous position, since it is understood that one generation influences the next generation (Statnicke 2019). Bontekoning (2011, 2012) develops his approach to generations based on cultural effects, and the sociological and historical contributions of each era. For Statnicke (279: 2019) a 'generation is not only a united group, born in a certain period, but also a common attitude, a response emerging from spontaneous impulses with an attempt to regenerate a common collective mental, emotional and physical development based on the evolutionary role of this generation'. According to Ensari (2017), this establishes a generational typology distinguishing the silent generation, the "baby boomers", the generation X, Y and Z. Our focus on the most recent generations is due to the interest in perceiving their propensity to different dimensions of alertness. Generation X considers individuals born between the 60s and 80s. They are in the middle or at the end of their careers, they have tried to solve their own problems, and they have even experienced, in some cases, lower standards of living comparing to their parents (Harper 1993; Tulgan 2000). They consider the balance between personal and professional life important, prefer flexible work arrangements and find the use of technology and the internet useful (Ensari 2017). Generation Y includes individuals born between the 80s and the mid-90s. They represent people who had their children later in life, are very protective, and intensely connected to internet technology (Sessa et al, 2007). They are very self-confident, prefer flexible schedules and they strongly support the concept of mobility. Generation Z comprises those born after the mid-90s. The major part are students, born in the digital age (Oblinger & Oblinger 2005), with preferences for flexible life models, used to live at a distance, they are expected to be well qualified, creative and they view the concept of authority as unnecessary (Ensari 2017).

2.1.2 Entrepreneurial alertness

Entrepreneurial alertness (EA) remains a prerequisite, and a relevant topic today to explain the identification and recognition of opportunities (Kirzner 1997; Archivilly et al, 2003; Baron 2007; Zhu et al, 2009; Tang et al, 2012). Kirzner (1973) considers that opportunities were not created, but were available in society to be discovered. 'Opportunities occur because the market is in state of equilibrium caused by faulty decision-making frameworks which in turn create shortages and surplus, wherein entrepreneurial opportunities can be found' (Sharma 2018). It is widely acknowledged that entrepreneurs have the capacity to identify opportunities and formulate an image of the future from there (Kirzner 1985).

Despite everything, the concept of EA carries with it some degree of uncertainty and ambiguity, being in some cases even associated with intuition (Dane & Pratt 2007), or even luck (Demetz 1983). Its association with perceptual and cognitive factors has made the concept difficult to be investigated (Busenitz 1996). In this way, it is considered an interdisciplinary concept, finding its bases in cognitive psychology – concerning attention, memory, intelligence, cognitive and evaluation functions (Chavouski et al, 2020). According to Sturm and Willmes (2001) the state of alert is made up of intrinsic and phasic aspects. The link between cognitive psychology and entrepreneurial orientation has only recently been systematized between the various types of alertness and the various approaches to opportunities. For Chavouski et al, (2020) the cognitive approach is divided in two dimensions. A centred person based on personality traits, contact networks (Ardchivily, Cardozo & Rey 2013; Nikraftar & Hosseini 2016), training and creative propensity (Shane, 2003). The other dimension is conditioned by the environment (situation-centred). It is understood that culture is a conditioning factor of perceptions and the way of responding to opportunities (Dana 2009, 2015), while environmental complexity

(Indrawati et al, 2015) munificence (Tang 2008) and market factors (Ghasemi & Rowshan 2016) translate into another dimension. In this line, EA is understood as a perceptual variable, which is related to information asymmetry (Minitti 2004), to learning and to the number of ideas generated (Sing et al, 1999). On the other hand, it is accepted that different individuals have different levels of alert in the face of similar contexts (Sharma 2018). As such, EA is an intangible resource, therefore one of the best cognitive abilities of entrepreneurs to identify opportunities (Baron 2006).

In this process, several measures were used to assess EA. They have evolved since Kaish and Gilad (1991), who used the dimensions of exposure to information, the sources of information and their evaluation, while Busenitz (1996) organized EA around two factors: 'reading alertness' and 'open-thinking alertness'. Valliere (2013) on the other hand, established a link between alertness and attention, given that certain structural and cultural factors condition attention. For Machado et al (91: 2016) 'each individual prepares his own scheme using associations between the existing schemes and the present stimulus'. Tang, Kacmar and Busenitz (2012) present a model for the analysis of EA based on three dimensions: information scanning and search, information association and connection, and opportunity evaluation and judgment. The first dimension of alertness integrates the search for information; the second-dimension favours associations between information; the latter dimension integrates the ability to find opportunities with a potential drive.

The level of alertness is associated with the way in which individuals identify and exploit opportunities (Gartner 1985). The different levels of alert should affect the number of opportunities identified. The different generations because of their experiences, skills and knowledge have different propensities to start new activities.

In this scope, the hypotheses of the present study are the following (Figure 1):

H1 a/b/c. Different generations have different approaches to discovery profitable opportunities.

H2 a/b/c. Different generations have different concerns in the search for new information.

Generations are made up of individuals of different gender (Malach et al, 2010), marital status, employment (Earlie & Sakova 2000), different cultural influences (Mueller 2004; Shinnar et al, 2012) and entrepreneurial intentions (Wilson et al, 2007). It is also confirmed that the different academic levels influence the entrepreneurial potential (Machado et al, 2016).

H3 a/b/c. different generations has different intentions to start a new activity.

The recognition of opportunities (Shane & Venkataraman 2000; Baron 2006) are directly related to individual perception, which allow the development and realization of a business (Ardichvily et al, 2003). A greater state of alertness influences a better identification and recognition of opportunities (George et al, 2016), a better development (Brockman 2014) and a more adequate assessment of the opportunity. Tang et al (2012) indicates that the integration and accumulation of tacit and explicit knowledge produce new knowledge. The connection and association of this knowledge, originate new connections, enhancing new projects.

H4. The search for new information positively influences the start of a new activity.

H5. Discovery profitable opportunities positively influence the start of a new activity.

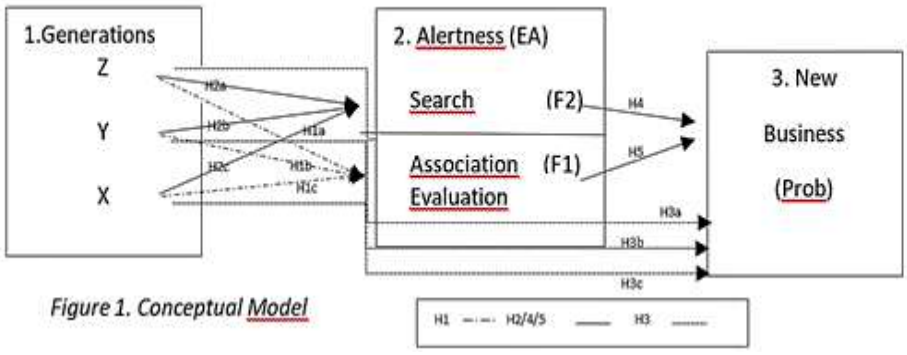

Figure 1: Conceptual model

3. Methodology

The methodology used in this study is quantitative and the sampling used were the snowball technique. The questionnaire was placed on social media and sent by email and requested to be disclosed during a period of two months. The mail survey was chosen since it is the fastest and most effective method of data collection, with a large geographic coverage, while ensuring the anonymity of the respondents; this method was also used in other studies (He & Li 2010; Turker 2009). The survey questions were tested through an exploratory factor analysis and the hypotheses were tested with the one-way analysis of variance (ANOVA). The factorial analysis reflects a set of statistical techniques that are helpful to explain the relationship between a set of observed variables in the sense that is simplifies data by reducing the number of variables described. The level of Cronbach's alpha was measured for each factor to assess the internal consistency of the factor. To ensure the reliability of the questionnaire, all the variables included in this research were obtained from prior studies. The study includes 3 generations based on age: X, Y, Z, and 13 items from Tang et al, (2012) construct, to measure the entrepreneurial alertness (EA). Five-point Likert-type scales, ranging from strongly disagree (1) to strongly agree (5), were used for all items. The items presented by Tang are divided into 3 dimensions – scanning and search, information association and connection, and information evaluation and judgment. The following items were used in the first dimension: I interact frequently with the others to acquire new information (P1); I'm always paying attention to new business ideas when I'm checking information (P2), I regularly read newspapers, magazines and other publications to gather new information (P3); I surf in the internet every day in search for information (P4); I am an eager researcher of information (P5); I am always searching for new information (P6). The second dimension integrates 3 items: I can identify associations between non-related information (P7); I know how to join the dots (discover opportunities by relating apparently non-related facts (P8); I usually detect connections between information from several knowledge domains apparently unrelated (P9). The third dimension includes 4 items: I have an instinct to find potential opportunities (P10); I can differentiate between profitable and non-profitable opportunities (P11); I have the talent to separate highly valued opportunities from low value opportunities (P12); When confronted with several opportunities, I am able to select the good ones (P13). The last variable was the probability (20-40-60-80 or 100%) to start a new business.

4. Results

4.1 Socio-Demographic characteristics

From the 978 consumers who were surveyed, 66.6% were Gen Z, 16.9% were Gen Y and 16.9% were Gen X, 46.8% were male, 52.0% were female and 1.1% have preferred not to tell, 37.0% have a secondary education and 59.0 % have higher education qualifications. To the question 'Classify the probability, based on identified opportunities, with which you will be able to develop a business in the future', 27.5% answered 20%, 24.6% answered 40%, 21.8% answered 21.8%, 17.1% answered 80% and only 9.0% answered 100%.

Table 1: Demographic variables

		Frequency	Percentage
Age groups	Less than 25	651	66,6%
	25 to 40	165	16,9%
	More than 40	162	16,6%
Gender	Male	458	46,8%
	Female	509	52%
	nd	11	1,1%
Education status	Primary school	39	4%
	High school	362	37%
	Bachelor/Master/PhD	577	59%

4.2 Exploratory factor analysis

An exploratory factor analysis was performed. It is also convenient to test, through the Bartlett's Test of Sphericity, if the correlation matrix used is the identity matrix and if its determinant is equal to 1. If this hypothesis is rejected, there is statistical evidence that there is a correlation between the variables, and you can proceed with the analysis. In addition to this test, the statistical Kaiser-Meyer-Olin (KMO) allows the evaluation the relationship between the simple correlations and partial correlations between variables. It is a statistic that varies between 0 and 1. In this case, the KMO = 0.958 and the Bartlett's Test of Sphericity = 7956.809 (p = 0,000). A principal component analysis with Varimax rotation was used for the exploratory factor analysis. Factor

loadings ranged from 0.576 to 0.816 and Cronbach's alpha coefficient ranged from 0.893 to 0.910. Details including mean, standard deviation (SD), factor loading, % of variance extracted (VE), eigenvalue and Cronbach's alpha coefficient are present in Table 2.

Table 2: Exploratory factor analysis results

Factor	Items	Mean	SD	Factor Loading	% VE	Eigenvalue	α
F1	P7	3.472	1.001	0.654***	34.434	7.459	0.910
	P8	3.521	1.024	0.700***			
	P9	3.381	1.062	0.576***			
	P10	3.463	1.046	0.701***			
	P11	3.651	1.043	0.811***			
	P12	3.553	1.026	0.816***			
	P13	3.723	0.962	0.805***			
F2	P1	3.676	1.077	0.659***	31.537	1.117	0.893
	P2	3.424	1.129	0.606***			
	P3	3.419	1.175	0.746***			
	P4	3.404	1.211	0.799***			
	P5	3.366	1.096	0.754***			
	P6	3.566	1.076	0.788***			

***p-value < 0.001

4.3 Testing the hypotheses

To test if there are differences between the three generations (Z, Y and X) considering the variables included in this study, was performed a one-way analysis variance (ANOVA) (Table 3). The tests for H1a reveals that the relation between the Z -Y generation and F1 has no significance (Average difference Z-Y = -0,104; p value = 0,365). The relation between Z-X and F1 is not significative either (Average difference Z-X = 0,053; p value = 0,876). Then H1a is rejected. Testing H1b, the result reveals that the generation Y for F1 is not significative - (Average difference Y-Z = 0,104; p value 0,365), (Average difference Y-X = 0,157; p value = 0,277). Then H1b is rejected. Testing H1c, for generation X and F1, the results were not significative (Average difference X-Z = -0,53; p value = 0,876), (Average difference X-Y = -0,157; p value = 0,277). Consequently, H1c is rejected.

Testing H2a reveals that the relation between Z and F2 are partially rejected. The generation Z are less prone to F2, than generation Y (Average difference Z-Y = -0,189; p. value = 0,050). Testing H2b, the relation between F2 and generation Y are partially rejected. The generation Y has more tendency than generation Z face to F2 (Average difference Y-Z = 0,189; p. value = 0,050), (Average difference Y-X = 0,095; p. value = 0,723). H2c test the relation between generation X and F2 which is not significant – (Average difference X-Z = -0.095; p-value = 0,723), (Average difference X-Y = -0,095; p-value = 0,723).

Testing the relation between generations and the probability to develop a new business presents different results. The hypothesis H3a is partially rejected. The generation Z was a greater tendency to develop a business than X (Average difference Z-X = 0,084; p-value = 0,001) and (Average difference Z-Y = -0,022; p-value = 0,749). The hypothesis H3b is equally partially rejected – (Average difference Y-Z = 0,022; p-value = 0,749), (Average Y-X = 0,106; p-value = 0,002). The relation with X generation and the propensity to create a new activity is totally rejected – (Average difference X-Z = -0,084; p-value = 0,001), (Average difference X-Y = -0,106; p-value = 0,002) (table 3).

Table 3: ANOVA results by Tamhane Test

Variable	Generation		Average Difference	Std. Inaccuracy	p-value
Prob	Z	Y	-0.022	0.024	0.749
		X	0.084*	0.023	0.001
	Y	Z	0.022	0.024	0.749
		X	0.106*	0.030	0.002
	X	Z	-0.084*	0.023	0.001
		Y	-0.106*	0.030	0.002
F1	Z	Y	-0.104	0.070	0.365
		X	0.053	0.079	0.876
	Y	Z	0.104	0.070	0.365

Variable	Generation		Average Difference	Std. Inaccuracy	p-value
		X	0.157	0.096	0.277
	X	Z	-0.053	0.079	0.876
		Y	-0.157	0.096	0.277
F2	Z	Y	-0.189	0.079	0.050
		X	-0.094	0.081	0.570
	Y	Z	0.189	0.079	0.050
		X	0.095	0.102	0.723
	X	Z	0.094	0.081	0.570
		Y	-0.095	0.102	0.723

*p-value < 0.05

For testing H4 and H5, was performed a linear regression by least squares. The model has the follow representation: $Prob_i = \beta_1 + \beta_2\ F1 + \beta_3\ F2 + V_i$. The results were as follow (table 4).

Table 4: Results of model estimation

Hypothesis	β	t	p-value	Conclusion
H4: F2 -> Prob	- 0,132	-2,695	0,007	Rejected
H5: F1 -> Prob	0,152	3,101	0,002	Accepted

The results shows that F2 negatively influences the tendency to start a new activity (β = - 0,132; p-value = 0,007). This result is not according to the literature. Contrary, the influence between F1 and the probability of starting a new business is real (β = 0,152; p-value = 0,002), this means, F1 increase the probability to start a new business.

5. Conclusions

Different generations have distinct profiles, and features. On the other hand, the state of alertness can be defined has a continuum, which means that some people have alertness and others do not (Sharma 2018). This study follows the principle that alertness is a key dimension to identify opportunities, and thus give rise to ideas that could generate new business (Gaglio & Katz 2001). The relationship between different generations and importance of combining new information and opportunities evaluation (F1) there no differences between generations. All generations gave the same importance to association of information, connections between unrelated information, and the relevance to evaluate opportunities with potential. Besides, belonging at distinct age group (X, Y, Z) they agree about the importance of these dimensions of alertness (Baron 2006). The relation between the different generations and the research for new information (F2), prove that generation Y has more propensity than generation Z. Underlies that new generations are more receptable and renew the importance of information. Our understanding could be by the fact that Y generation has more self-confidence, success needs, desire for independency and risk-taking tendency, while Z generation has the opposite (Ensari 2017). While X generation being the oldest and is between the generation Y and Z features reveals more interest in research and acquire new information. The relationship between generations and the creation of new businesses, demonstrate that do not exist differences between generations Y and Z, but however exist differences between generation Z and X, and between Y and X. Generation X do not have interest in developing new businesses. Recent generations appear more receptable for starting a new business. Despite generation Z being the less confident, less desire for independence, and less risk-taking (Ensari 2017) the results are not coherent with these profiles. The justification for generation X being afraid for starting a business, could be, for being at mid-career or late career and searching for balance in life (Ensari 2017). Finally, the relevance of research and explorations of information (F2) is less relevant for starting a new business, while the association and connection between information, the evaluation of potential and profitable opportunities (F1), are considered central to start a new business (Gartner 1985). These confirm the works about alertness state at literature (Kirzner 1979, 1997; Baron 2007; Tang et al 2012; Machado et al 2016).

These results should have some limitations because the sample is predominantly made up with people with age lesser than 25 and higher degree. A different approach to generations type could gave news insights about the influence of EA on development of new ventures. Future developments should explore if different generations develop different approaches to explore opportunities (causation and effectuation).

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Social Media for Small Business Owners: Overview of Good Practice

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Abstract: Entrepreneurs are facing daily challenges when offering their services or products to their clients. This is, even more a challenge for small business owners who need to invest their resources and are yet to find their market niche and clientele and have a long way before they establish themselves on the market. In order to grow their business and be successful with placing their services and products on the market, they can use often affordable and widely available resources in technology and social media. How to set a good marketing campaign and launch it on social media and use tools to reach the target audience – this something every small business owner should ask themselves. Every business owner should adjust their marketing strategy to available social media platforms. With a carefully set marketing strategy that includes an elaborate social media plan, a business can profit and improve its sales. A small business should be aware that mindful use of social media can help in achieving advertising goals and reaching current and future customers. Social media became an essential part of everyday life. On the other hand, not every social media channel is suitable for every small business. It is up to every individual small business to decide on an optimal social media strategy to grow and strengthen the business. The paper will present the advantages of using social media for small business owners, which can be implemented in practice. The paper has a goal to present good available practices in using social media to grow a small business. Based on the conducted research of published papers and other resources, the paper aims to showcase how to expand a small business with the use of social media and how to optimize the marketing goals. The paper can be useful for startups and small businesses, and it will highlight good practices in using available technology and social media.

Keywords: small businesses, social media, marketing strategy

1. Introduction

When individuals are small business owners, they should accept the risk for new business activities (Turner, Endres, 2017). In addition, a small business owner should search for creative means to complete business tasks on a limited budget (Turner, Endres, 2017). With social media, they can achieve that and access a new form of communication with cost-effective results (Turner, Endres, 2017). Popular and with a significant number of users, social media are the tool that can be a competitive marketing weapon for a business (Hassan, Nadzim, Shiratuddin, 2015). Social media stands for "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0. Social media allows creation and exchange of user-generated content" – this is the definition of social media by Kaplan and Haeenlein (2010). Social media changed the means people interact with each other (Olanrewaju et al., 2020). Social media changed online interactions (Mack, Marie-Pierre, Redican, 2016, Constantinides, Fountain, 2008). Social media are a platform where users create their content and can join different groups or pages related to a product or service of their interest (Šerić, Marušić, 2019). Facebook has more than 2.3 billion users, while YouTube, Instagram, and WeChat have more than a billion users. (Our World in Data, 2019). Social media includes projects, blogs, content communities, social networks, virtual games (He W et al. 2017, Kaplan, Haenlein, 2010).

Customers often use social media to find relevant information before purchasing decisions (Hassan, Nadzim, Shiratuddin, 2015). Social media and online marketing strategy can help with offering customers interactive methods of displaying products or services (Hassan, Nadzim, Shiratuddin, 2015). As a result of increased use of social media, customers feel empowered, actively produce user-generated content, and have increased expectations accordingly. (Durkin, McGowan, 2013, Barwise and Meehan, 2010). Individuals and entrepreneurs can use social media to successfully obtain target customers (He W et al., 2017). For a business to successfully advertise products and services, social media can be a helpful tool and an easy platform to interact with other entrepreneurs (Olanrewaju et al., 2020, Quinton, Wilson, 2016). Businesses that use social media can provide promotions, for example, special discounts, contests, and pre-sale services. (Hassan, Nadzim, Shiratuddin, 2015). Entrepreneurs use social media for multiple reasons, which are essential for their business activities. (Olanrewaju et al., 2020). Many small businesses are dealing with different resource limitations, and with the use of social media, they can improve their marketing strategy and reach customers with little expense. (He W et al., 2017). Social media is a valuable tool in the early stages of entrepreneurship as there is a need for information and can boost starting up a business (Olanrewaju et al., 2020). Additionally, social media can help

small businesses and entrepreneurs share word of mouth and build social connections with customers and other businesses. (He W et al 2017, Durst, Edvarsson, 2012).

This paper will investigate ways an entrepreneur can profit and improve their business by using social media. The contribution of the paper is to put together good practices of using social media in business activities. The purpose of the paper is to offer entrepreneurs a better understanding of the benefits of social media and how to use it successfully. In addition, the paper aims to show an overview of good practices related to the use of social media with small businesses and entrepreneurs.

2. Methodology

The paper will analyse available academic papers that researched trends of using social media for entrepreneurs. The paper preparation was done by considering available papers on Google Scholar. The search criteria for selected published papers were recently issued papers with relevant information. Selected papers covered the use of social media for startups and small companies and the use of social media by small business owners and their companies. By analysing the available papers, this paper will gather the valuable practice in using available tools online to gain more customers and better business results. The main research topic aims to see if social media use can benefit entrepreneurs and their businesses. The paper will research how to optimise the tools available in social media for the best business results. It will present good examples in practice which can be something an entrepreneur can implement in their business.

3. Descriptive analysis of research findings – use of social media by entrepreneurs

3.1 How entrepreneurs and small businesses use social media

After researching small businesses, He et al. (2017) found out that Facebook was the dominant social network and based their paper on Facebook adopters. The small businesses who use social media included in a case study by He et al. (2017) posted daily specials, promotions, recipes, events, and other content to their fans on Facebook. They frequently responded to customer comments and had interesting conversations with their fans on Facebook. Almost half of all social media adopters promoted their social media sites inside their stores by displaying URLs and QR codes (He et al., 2017). As the primary motivation to use social media, the small business owners stated different reasons (He et al., 2017). Some respondents said it was fun to use Facebook to keep in touch with customers. One of the respondents said he found interesting any new technologies that to attract more customers. Some small business owners who participated in research just used social media because their peers also used it. (He et al., 2017).

Many respondents from He et al. research (2017) said the owners or managers managed social media. Some others had staff members managing it, while only one had a third-party marketing company (He et al., 2017). All social media adopters mainly counted on traditional advertising methods instead of social media marketing (He et al., 2017). He et al. (2017) found several decision-making factors that influence social media adoption by small businesses for business purposes. These factors present social media adopter's perception of social media, including perceived ease of use, perceived usefulness and perceived enjoyment, the adopters characteristics including age, educational level, familiarity with social media, and willingness to try out new technology, social influence from peers and or media, current business performance and business purposes including marketing and CRM (He et al., 2017).

Other research conducted by Olanrewaju et al. (2020) created an interactive framework based on other papers covering trends in using social media with entrepreneurs. Several antecedent factors impact social media use within the framework, including technological, individual, organizational, and environmental factors (Olanrewaju et al., 2020). Technological factors include cost, performance expectancy, effort expectancy, perceived risk, trust, enjoyment, facilitating conditions, interactivity, success factors (Olanrewaju et al., 2020). Individual factors include individual demographics, organization characteristics, management characteristics (Olanrewaju et al., 2020). Organizational factors include organization demographics, organization characteristics, and management characteristics (Olanrewaju et al., 2020). These imply factors like business size, age, complexity, innovativeness, business industry, and technological orientation like technology competence and IT knowledge of employees (Olanrewaju et al., 2020). Environmental factors include external pressure and other less researched factors such as mobile environment, entrepreneur legitimacy, and legal procedures. (Olanrewaju et al., 2020). Antecedent factors are preconditions for social media use, including marketing,

information search, business networking, and crowdfunding (Olanrewaju et al., 2020). Marketing via social media is for companies that offer B2C products and services (Olanrewaju et al., 2020, Kantorova, Bachmann, 2018). Social media marketing strengthens product or service visibility and encourages sales (Olanrewaju et al., 2020, Dutot, Bergeron, 2016, Taneja, Toombs, 2014). Marketing on social media is done with social media activities that include posts, messaging, promotion information (Olanrewaju et al., 2020, Shih et al., 2014). When a business wants to increase sales, it can analyse the influence of used promotional activities (Šerić, Luetić, 2014).

Another helpful activity on social media is networking. Entrepreneurs use social media to create, enlarge, and strengthen networks (Olanrewaju et al., 2020, Ahmad et al. 2018, Fischer, Reuber, 2011, Quinton, Wilson, 2016). Finally, social media has an influence when it comes to crowdfunding, where social media is a platform where entrepreneurs can share videos and images and share among their network (Olanrewaju et al., 2020, Roedenbeck, Lieb, 2018). In addition, entrepreneurs use social media to search for information as they often do not have the funds to hire someone to do it for them (Olanrewaju et al., 2020, based on Kuhn et al., 2016, Quinton, Wilson, 2016).

Several moderators and mediators can impact social media usage and help reach positive results (Olanrewaju et al. 2020). Moderators include social skill competency, social media sales intensity, social media capability, innovation capability, social customer relationship management, social media use, type of social media platform, community characteristics, demand articulation, resource mobilization capacity. Mediators include communication performance, trust, selling capability, marketing capability. Finally, all mentioned activities and factors should be enhancing entrepreneurial business process, performance, driving firm innovation, and value creation. With all these factors impacting social media use and final results, a business should recognise applicable and improve results by adjusting moderating and mediating factors (Olanrewaju et al., 2020).

3.2 Examples of good practice

This chapter will present examples of good practices when using social media for small business owners. Available research showed a positive relationship between social media usage and business performance (Olanrewaju et al., 2020). Furthermore, social media's effect on entrepreneurial innovation shows that social media supports ideas, interactions, knowledge search, and it also has a remarkable effect on entrepreneur behaviour (Olanrewaju et al., 2020).

Social media can improve brand awareness, increase sales, improve customer service, and set up marketing campaigns (He et al., 2017). One of the primary purposes of adopting social media is to improve marketing strategy and customer relationship management (He et al., 2017). In order to successfully offer its products and services, a business should manage with a promotional mix of its brand (Šerić, Peronja, Marušić, 2020). By managing a promotional mix, a business can become compatible with the values and needs of customers (Šerić, Peronja, Marušić, 2020).

In order to successfully use social media, a small business should have a ready plan of adapting social media to their business and have constant planning related to content (He et al., 2017). Additionally, they should know that social media requires a significant amount of time (He et al., 2017). Therefore, they should recognize that social media management requires a professional and dedicated staff to manage social media, potentially outsourcing this task (He et al., 2017). If a small business decides to manage social media independently, it should learn to use social media correctly (He et al., 2017). After setting up social media, a small business should use metrics such as average reply time, number of complaints, number of praise, number of fans and followers, and number of mentions on the web to measure the impact of social media use (He et al., 2017).

A small business should optimise the use of social media to actively promote their social media online (He et al., 2017, Pérez, Ruiz, Blas, 2013). At the same time, offline activities should include building solid relationships with target customers and engaging with social media users (He et al., 2017, Pérez, Ruiz, Blas, 2013), collecting email addresses to create a base, and send information about promotions (He et al., 2017, McCarthy et al., 2014).

Strategy to get attention from a customer consists of several activities. These activities include advertising on social media sites, following other social media accounts, use tagging properly, encourage discussion about the product or service, use the search engine, use referrals by current customers or followers, use traditional

marketing promotional tools, cross-link all social media and website, use affiliate marketing (Hassan, Nadzim, Shiratuddin, 2015). In addition, a small business should provide information about products or services, show pictures, offer up-to-date information about the business and products or services, advertise new products or services via social media to encourage interest among customers (Hassan, Nadzim, Shiratuddin, 2015). Furthermore, it is advisable to offer promotions, organise contests, offer gifts, update social media, answer customer requests, and offer good customer service with such activities. Furthermore, a small business can conduct customer endorsements, promotion information, and business activities (Olanrewaju et al., 2020, Shih et al., 2014). Finally, a small business should offer an easy buying process, have clear payment information, and organize delivery options to achieve action and encourage purchase decisions (Hassan, Nadzim, Shiratuddin, 2015).

4. Conclusion

This paper put together findings of previously published papers related to social media use among small businesses and entrepreneurs. Although there are limitations in not including all the available papers, this literature review highlights valuable conclusions from analysed findings. Paper highlighted extended use of social media among users who can turn into customers and entrepreneurs who show interest in using new technology and social media. Based on available resources and published papers, it can be visible that small businesses and entrepreneurs can only profit from the active use of social media. Therefore, it would be advisable for any entrepreneur to actively use social media and base its social media and marketing strategy on its target audience and customers.

Entrepreneurs and small businesses should carefully choose the social network to encourage target customers to engage in social media content actively and finally make a purchase decision. Social media should support numerous business processes and entrepreneurs in any industry. While it is worth investing in social media, every business should decide on its available budget. A small business should carefully plan a budget, while social media can only support other promotional activities for some businesses. At the same time, some businesses can boost sales with strategic social media campaigns, promotions, and engagement from followers and customers.

Depending on the main aims of a small business, social media can be an additional promotional channel or sales platform. However, no matter the most suitable marketing strategy, several steps can help small businesses grow and boost sales. Firstly, it should identify which social media platform suits the business and reach the target audience and potential customers. Secondly, it should follow the main guidelines and up-to-date advice for each social media platform.

Furthermore, a small business should engage with its social media followers and encourage interaction. It should use social media to create awareness about the brand and the product or service offered. This strategy should upgrade with potential additional business goals such as investing in networking with other entrepreneurs or reaching potential customers. A business should create a mix of social media activities under the brand of the product or service they offer to customers.

It is not enough to actively use social media, and it is essential to track and measure the conversions connected to social media content. A small business should analyse obtained results and see if some activities should be changed or adjusted to improve social media activities. There might be options where activities related to a social media campaign can improve.

Overall, social media is a valuable tool for any small business or startup that can profit from this promotional channel's availability and cheap use. It is an excellent business decision for any small business to have at least one social media network as it can reach its target customers with a user-friendly and affordable platform. With a carefully planned social media and marketing strategy, social media can be a simple way of reaching current and future customers. With such a straightforward way of reaching customers, a small business has more time to focus on productivity and product or service development. The value of social media is that there is no need to have expensive marketing budgets to achieve set sales or marketing strategies. These findings offer a small business a better overview of the benefits of using social media in business processes. A small business can achieve its business aims and have a better-defined marketing strategy with such knowledge.

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A Praxeological Perspective on Innovation Management and Design Thinking

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Abstract: Innovation Management is undergoing a crisis. The uncritical adoption of late-modern, creative innovation practices such as Design Thinking (DT) (Brown, 2009) contradict the modernist rationality of planning, managing and measuring success. These frictions, which can lead to talent loss and frustration (Augsten and Marzavan, 2017), can be regarded as symptoms of an epistemological crisis. One possible cause is the structural separation of exploitation activities (production and distribution) and exploration activities (disruptive innovation) (O'Reilly and Tushman, 2008) that push late-modern activities like DT to the periphery of organizations or into separate units. Academic attempts to understand DT's overall impact on an organization generally remain descriptive (Schmiedgen et al., 2015). More detailed research either focuses on design as an organizational function (Junginger and Faust, 2016) or on how DT helps develop individual capabilities (Liedtka, Hold and Eldridge, 2021). This paper juxtaposes classical innovation-management enablers with DT assumptions in order to highlight limitations of the structure vs. agency dichotomy. It proposes a praxeological perspective on innovation management, operationalizing the concept of social practices as "routinized types of behaviour" (Reckwitz, 2002). DT as a social practice is carried out in a net of interconnected elements and cannot be reduced to any one of them. This theoretical framework aims to inform future DT and innovation management research to reposition their epistemological assumptions within the discourses of late modernism—to be better prepared for future crises.

Keywords: design thinking, innovation management, social practice theory

1. Innovation and design thinking: Tackling wicked problems in times of crises

According to Tidd and Bessant (2018), innovation management curricula include the means companies and entrepreneurs use to *exploit change and uncertainty* as an opportunity to come up with a different service, product, or business offering. This context of change and uncertainty also creates opportunities for fuzzy, elastic and integrative, holistic, post-rational practices like Design Thinking (DT). As analyzed by Rittel and Webber (1973), "wicked problems" elude a final best solution, requiring DT's iterative and explorative process (Buchanan, 1992). These ill-defined cases are constantly re-defined during the problem-solving process. Traditional management and planning activities are beneficial to organizations in stable contexts but can be unsuitable for changing internal frameworks like development cycles or changing external frameworks such as the global pandemic.

Schiefloe (2020) analyzes the COVID-19 crisis using Rittel and Weber's 1973 theory of wicked problems and concludes that the pandemic cannot be approached by analytical problem-solving. Schiefloe proposes handling the crisis through "collaboration and coordination between different actors at all levels as preconditions for being able to address such complex governance challenges" (p. 7).

Other innovation researchers too recommend using post-rational innovation enablers to tackle the multiple crises posed by the current pandemic. Chesbrough (2020) examines "open innovation" and its collaborative logic as a possible way out of the COVID-19 crisis, while Greve et al. (2021) plead for Living Labs to bring together academia, civil society, and the public and private sectors. Schiefloe (2020), Chesbrough (2020) and Greve et al. (2021) agree that companies need to be exploring collaborative solutions to complex problems beyond their institutional boundaries and traditional innovative problem-solving.

It is useful to look at the modern history of management to understand why these approaches are considered rather progressive. Throughout most of the 20th century, management's task could be described as "managing certainties." The notion of the organization as a well-functioning machine (Morgan, 1998) was mainly shaped by the administrative approach of Henri Fayol (1918) and his principles of corporate governance with integrated planning, organization, command, coordination, and control functions. The same applies to the management approach of Frederick W. Taylor (1911; 2004) and his scientific management method for maximizing productivity through labor process division, skill specialization, rationalization, and work-process optimization. These

approaches underlie modern organizational theory and often still inform the operation of organizations and management (Hatch and Cunliffe, 2013).

Reckwitz's analysis shows how this one-dimensional discourse on modernity (solely from a rationalistic perspective) is not complete: "Modernity (…) from its very beginning has been composed by two divergently organized dimensions: the rationalistic dimension of standardization, and the cultural dimension that involves the attribution of value, the intensification of affect, and singularization" (Reckwitz, 2020, p. 9). He connects "non-rationalistic modernity" to the romanticism of the Arts and Craft movement (between c. 1880 and 1920) and esthetic-revolutionary movements antagonistic to rationalistic modernity.

His dual perspective on modernity helps us to see the current late-modern age as a smooth transition rather than a radical break with traditional modern organization. The non-rationalistic, cultural-affective dimensions revived by approaches such as DT only shifted the rationalistic features of standardization and efficiency to the background but did not completely discard them.

In this light, DT can be regarded as a natural development for harnessing the innovation and creativity unleashed by economic, environmental, and political crises. DT and related post-rational innovation approaches such as Coworking, Lean Start-up, and Living Labs may be regarded as strategies for organizations to cope with uncertainty and pursue innovation. The collective approach to design and creativity marks a paradigm shift from modernity to late modernity that deserves more attention in innovation management studies. While DT supports the revival of non-rationalistic modernity, its uncritical adoption in organizations creates friction.

2. DT and innovation management: Similarities in nature and process

The adoption of DT as a creative, iterative, human-centered approach to problem-solving (Brown, 2009) contradicts the modernist rationality of planning, managing, and measuring success, leading to friction. Analyzing the roots of these frictions could indicate the discipline's epistemological crisis and highlight the need for new approaches to innovation management. While similarities between DT and innovation approaches have made it easy for DT to find a way into organization, the epistemological differences reveal conflicts.

The current COVID-19 global pandemic that has sparked local and global calling for radical business, social, and technological innovations. Schiefloe (2020) argues that "wicked problems" like those caused by the pandemic require post-rational innovation practices like DT. Design and DT have found their way into specially designed innovation departments and Innovation Labs in almost every large organization (Schmiedgen et al., 2015) where DT serves as a tool and process for developing new products, services, or cultures. DT is mostly applied to tackle disruptive innovation. When introduced into organizations, it often triggers broader cultural change, with the launch of disruptive products revealing conflicts between explorative and exploitative working environments (Augsten and Marzavan, 2017).

Comparing the **nature of innovation**—products, process, positioning, and purpose—with the popular Four Orders of Design by Buchanan (1992) reveals their similarities. Buchanan shows where design and DT can be applied as innovation enablers to (re)design tangible products and material objects, intangible activities, and organized services or processes, as well as the complex systems of learning and working related to a company's purpose. In a paper from 2016, he argues that systems design is another important field helping to innovate organizational and business design: "[E]ven the financial system of a company can and must be designed if we are thinking of business design seriously and radically" (Buchanan, in Junginger and Faust, 2016, p. 34).

The figure above suggests that innovation concepts and design concepts are compatible—and indicates why DT has prevailed in the field of innovation, despite being dismissed as a fad (Nussbaum, 2011).

Another similarity between innovation and DT concepts is **the process of innovation**. The main challenge for most organizations is finding a way to manage *innovation as a process* as part of their daily core activities. This implies managing resources and efforts within the different innovation types and adjusting the organizational support structures, roles, and procedures. Innovation management researchers agree that underlying all innovations is a unified process with three phases: searching, selecting, and implementing (Tidd and Bessant 2018, p. 40).

Figure 1: Buchanan's Four Orders of Design, Buchanan 2001.

A *divergent cognitive style* opens opportunities, scans the internal and external environments for signals or threats and opportunities for change; an *emergent style* allows a multitude of ideas to evolve; and the *convergent style* is practiced by rational management to follow through the implementation.

In the *divergent*, problem-setting phase, stakeholders must be convened and commit themselves to collaborating. The *emergent phase* supports signal selection by strategizing about how the enterprise can best develop. In the direction-setting collaborative phase, stakeholders explore the problem in depth and reach agreement about alternatives. The *convergent phase* focuses and helps translate the potential idea trigger into something new and valuable for the company and its markets. This includes implementing and launching the innovation in an internal or external market as well as capturing the innovation's value for sustaining adoption and diffusion, gradually learning, and building up the knowledge base. Knowledge and resources are gradually acquired throughout the exploration and exploitation areas.

These three phases resemble the DT processes of the Hasso Plattner Institute (HPI d.school) of 2009, which emerged from a collaboration of academics and practitioners. IDEO, a design and innovation consultancy in California, popularized DT at the University of Stanford. In 2009, SAP, a leading IT company, founded the HPI d.school at Potsdam University in Germany, where the following six-step model (Figure 2) was presented. This resemblance of the DT process to the traditional innovation process is one reason for its vast acceptance combined with three phases of innovation according to Tidd&Bessant, 2018, p.63.

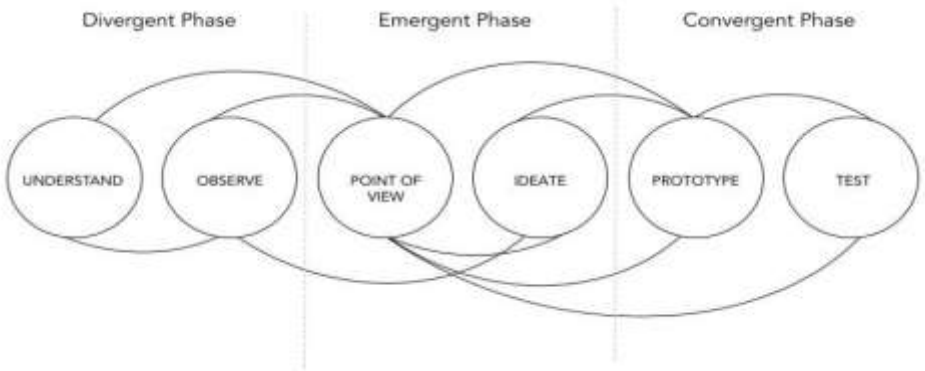

Figure 2: DT iterative process according to Hasso Plattner Institute (HPI)/ d.school Stanford, 2009 (retrieved https://hpi-academy.de/en/design-thinking/glossary.html, 12 Apr. 2021)

This model attributes understanding and observation to the divergent thinking and problem-framing space; developing a unique point of view and ideating to the emergent phase; and prototyping and testing solutions to the convergent phase. The duration, significance, and difficulty of any particular phase varies according to the nature, degree, and level of innovation. Other factors also influence and may alter the process and outcome of innovation efforts—depending on how leadership, teamwork, employee involvement, organizational structures and processes, methods, and tools work together and serve the innovation.

The HPI d.school model reveals the dual modes of innovating within the general innovation process and DT. An organization's innovation capabilities depend on exploiting current technologies (through incremental innovation) while also exploring variations in products, processes, positioning, or purpose (through exploratory innovation) (March, 1991; Teece et al., 1997). Striking the dynamic balance between exploratory and exploitative innovation is difficult. One difficulty is connected to the organization's structure, inter-functional linkages, and processes. DT can help facilitate communication between disciplines, cultures, and departments. (Schmiedgen et al., 2015; Liedtka, 2020)

2.1 DT: The link between exploration and exploitation activities

Ambidextrous organization, a possible way to ensure an organization's dynamic capabilities, was extensively researched by O'Reilly and Tushman (2007). Ambidextrous organization designs include highly differentiated but weakly integrated subunits. *Exploratory units* are small and decentralized with explicitly innovative climates, cultures, and adaptive processes, while *exploitation units* are larger and more centralized, with tight cultures and processes.

Exploratory units experiment and create minimum viable products (MVPs), and often rapidly get user feedback (Sitkin, 1992). But innovation management programs tend to drive out experimentation and are prevented from migrating into exploratory units. In contrast, exploitation units reduce variability and maximize efficiency and control through tight coordination and substantial process management efforts.

These contrasting units tend to be physically and culturally separated from each other, with different measurements and incentives and distinct managerial teams (O'Reilly & Tushman, 2007). The teams need to skillfully transfer ideas to market and enable the two cultures. The capacity of organizations to absorb disruptive ideas from exploration units and bring them to market using exploitation units is challenged by the usual physical separation of innovation labs and motherships, as well as by conflicting cultures and leadership styles (Augsten and Marzavan, 2017).

However, building up "absorptive capacity" requires frequent meetings to develop mutual understanding and diffuse tacit knowledge through social networks that often depend on spatial proximity and culture (Nooteboom, 1999) . Organizations rely on entrepreneurial managers with ambidextrous cognitive capabilities. Their senior managers must "support entrepreneurial leaders by shaping the organizational environment and creating the kinds of flexible organizational processes needed to support individual managers' capability development" (Liedtka, 2020, p. 58).

The extensive research conducted by March (1991) on ambidextrous organizational structures can be seen as a reaction to leading companies' urgent need to innovate due to various crises and digitalization. The conflicts between design and management, serendipity and reengineering, experimentation and repetition, disruption and routinization are resolved by managers with diverse skill sets who can navigate both worlds.

Dynamic Capabilities (March, 1991) and ambidextrous organizational structures in traditional organizations have been studied extensively over the last decade (O'Reilly and Tushman, 2007). According to Martin (2009) as a managerial social practice, DT can facilitate exploration and exploitation activities if it is infused into the whole organization. Adapting and evolving organizations need to simultaneously explore and exploit because innovation occurs and tends to be rewarded where exploitation is rapidly exploited (Clegg et al., 2005).

3. How DT has been researched in the past

Researchers either focus on design as an organizational function (Junginger and Faust, 2016) or on how DT helps develop individual capabilities (Liedtka, 2021). They adopt a modernistic agency vs. structure dualism to explain a late-modern phenomenon that by definition dissolves the dichotomy. Liedtka (2020; Liedtka et al. 2021) and

her colleagues were the first to describe DT as a social technology and analyze its impact on dynamic capabilities. They developed a system for decodifying the innovator's learning journey along the emergent and convergent phases of the DT process. They identify how different personality types feel more at ease with certain activities—for instance, analytic people may feel comfortable analyzing data in the divergent phase but reject the ambiguity of generating ideas in the emergent phase. Their empirical longitudinal studies find that articulating missing skills can help managers create their individual plans for developing dynamic competencies. They term such individual competency development "Minimum Viable Competency" (MVC) and suggest that pursuing innovation with DT could especially help people in exploitative activities.

Besides a long tradition of investigating designer practices (Simon, 1969; Schön, 1984), DT has also gained much attention in recent innovation and management debates (Boland et al., 2008; Martin, 2009; Carlgren et al., 2016). Scholars like Peter Gorb, Brigitte Borja de Mozota, Rachel Cooper, and Richard Buchanan had written about strategically using design in organizations and coined the terms "Design Management" and "Design Thinking" in the 1980s and 1990s. Design research scholars have been analyzing the power of interdisciplinarity, co-creation, and fast prototyping under the terms "user-centric design", "participatory design," and "UX" since the 1960s. There is extensive knowledge on design tools, methods, and processes, user needs, ideation, prototyping, testing, and redesigning to enhance product and service innovation (Kumar, 2012; Liedtka, 2015). Other research focuses on the conditions needed to support team dynamics (Stempfle and Badke-Schaub, 2002), co-creation (Sanders and Stappers, 2008), creativity (Tschimmel, 2022), and creative confidence (Kelley and Kelley, 2013). Only a few authors have stressed the differences between managers' and designers' attitudes (Carr et al., 2010; Michlewski, 2015).

Organization theorists like Hatch and Cunliffe (2012) argue that "designerly" (Cross, 1982) approaches replace classical organization development practices with activities such as workshop intervention, informed by studio design. Hatch and Cunliffe (2013) compare designerly interventions in organizations with the postmodern philosophical approach by Deleuze and Guattari (1995) of a "line of flight" to describe escape routes within hierarchy and bureaucracy. In this sense, designerly approaches in organizations can be described as "breaking up stratified systems such as those of hierarchy privilege or habit undermining the repression of silo thinking" (Hatch and Cunliffe, 2013).

Summing up, past approaches to understanding DT were cognitive—exclusively studying behaviors and cognitive processes while engaging in DT, or more recently, examining the attitudes of DT agents—or structuralist, looking at how design impacts the organization and structure, how DT is used for business strategies, and possible drivers for organizational change or transformational design.

Despite the different but often overlapping approaches, one basic assertion can be made: Design has expanded from being a matter of practical expertise into a social activity, with many scholars seeking to determine how DT informs structures and individuals. DT led to applying "designerly ways of knowing" (Cross, 1987) to all kinds of areas, from business to health care and education in response to an identity crisis of industrial designers. Design has become used by business management and in organisation charts to help companies innovate more quickly and gain competitive advantage during periods of crises and structural transformation.

We still need to understand how DT artifacts (prototypes, wireframes, etc.) mediate between exploration and exploitation units. New frameworks to explain this will help us analyze and theorize about other creative, late-modern innovation practices like Hackathons (Bertello et al. 2021), Living Labs (Greve et al., 2020) and Coworking Spaces (Merkel, 2019).

4. Discussion

Complex innovation practices occur at the intersection of actors, processes, and organizations. Modern social theory focuses on the agent and its attributes to explain action and social order. Cultural theory states that implicit or unconscious knowledge determines which desires are acceptable and which norms legitimate. "Shared knowledge" or cognitive-symbolic structures reproduce social order, rather than just individual attributes. Cultural theory explains actions by reconstructing symbolic structures of knowledge and artifacts that constrain actors to act in a certain way.

Within cultural theory the practice turn offers at first encounter a vast and satisfying vocabulary to better understand and explain DT as an innovation practice. It not only offers a new conceptualization of terms like body, mind, things, knowledge, discourse, structure/process, and agent, but by identifying "practice" as the smallest unit of social theory, it shifts the focus from individual but still incorporates textualist and intersubjective considerations. DT terms prepare the ground for analyzing plural systemic contexts. Reckwitz defines practice as:

> *"A routinized type of behavior which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge. A practice … forms so to speak a 'block' whose existence necessarily depends on the existence and specific interconnectedness of these elements, and which cannot be reduced to any one of these single elements" (Reckwitz, 2002, pp 49-50).*

A practice is regarded as intersubjective, a shared way of doing based on shared understandings and social conventions: It is not just individual. Regarding DT as a "practice" would make it a way of doing and thinking as a "block." The elements must be interconnected and cannot be reduced to any single element.

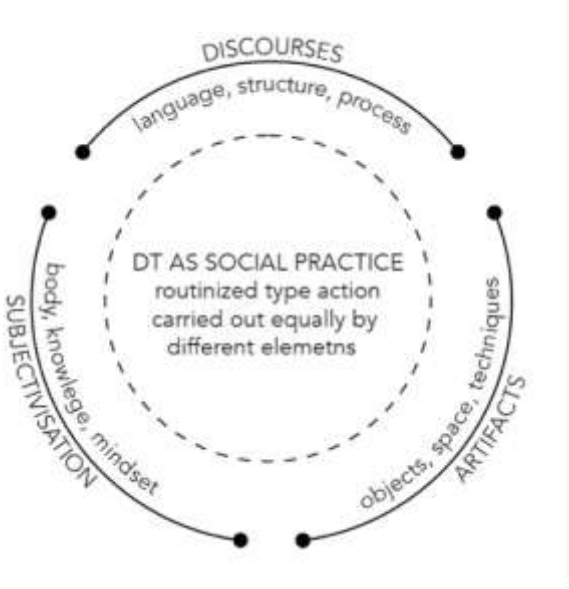

Figure 3: DT as a set of social practices, adapted from Reckwitz (2002)

DT as seen through this praxeological lens can be defined as a set of practices or as a set of routinized actions carried out equally by discourses, artifacts and subjectivisation.

Discourses convey social meanings and bind subjects to these social meanings and associated meaningful practices. Through the enforcement of certain meanings, the social order of the organization is established. *Discourses* convey values and value structures and processes to individual actors by providing the only available grids and terms for understanding events (Reckwitz 2002). Analyzing external innovation units, Labs and innovation processes and techniques as well as the language and jargon surrounding these structures might reveal interesting insights from a praxeological perspective.

Subjectivisation affects the relationships of subjects towards themselves and the imagination of people (Reckwitz 2002, Richter 2014). Depending on the cultural context, individuals are influenced in particular through discourses that describe how to understand and behave. However, that doesn't mean that they feel forced into a certain role. Most of the time, subjects consciously take on a range of social roles and perceive themselves to be free-thinking and acting (Richter 2014). How individuals understand their own identity, deal with it, and actively shape their body and mindset, is part of subjectivisation processes. The new roles of innovation managers, DT facilitators and the self-understanding of transformative leaders are aspects that could be analyzed through the praxeological lens.

Practice theory highlights the active role of *artifacts* as the side of the social. Artifacts perpetuate practices in time and space through their role or memories and actions inscribed in them by their constituency. For example, a physical prototype of a novel product displayed in an office space enables the reproduction of the innovation practice in another time and space. Schweitzer and Wechsler (2019) define as 'design artifacts' explicitly only artifacts that have been made during the design process such as prototypes, customer journey maps and wireframes and not those that constitute the final product or service. These types of artifacts are essential to the negotiation of meaning and shared understanding between individuals, and they shape the organization.

Discourses, artifacts and subjectivisation processes are understood as equal elements that are carried out in innovation practices and influence how people behave, think and understand themselves.

Comparing some of the main concepts from innovation management it becomes clear that they regard only two aspects: actors and structures. Particularly newer innovation enablers like Maker Spaces, Hackathons, Living Labs need a new vocabulary that encompasses the perspective of artifacts and their meaning in innovation practices. Hereby practice theory offers a way to shed light on the innovation practice as a social phenomenon and decode it from various perspectives acknowledging that all elements work in an interconnected net. Late-modern innovation practices like DT encompass leadership concepts, organizational design concepts and concepts about artifacts and techniques. Each perspective is valuable, and all elements evolve in relationship to another.

5. Outlook

This contribution does not support the uncritical claim that, because it is holistic, DT can "be practiced by everyone and extended to every field of activity" (Brown, 2009, p. 241). It shows instead how DT might be carried out either intentionally or not by explorative and exploitative units and how it manifests through actors, processes, language, and artifacts. Inviting creative late-modern innovation practices into organizations might reveal conflicts—and provoke innovative management.

Moving the epistemological assumptions of managing innovation through DT within the discourses of late-modernism and even post-modernism can help prevent frictions between new and existing business domains, and between exploration and exploitation.

The challenges confronting late-modern societies include climate change, pandemics, economic crises, and racial unrest. Innovation and problem-solving frameworks to respond to economic, political, environmental, and social crises must be pluri-dimensional and versatile—just like the "wicked problems" they are trying to solve.

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Analyzing the Impact of Technological Innovation During COVID-19 Outbreak in Romania: A Pilot Study

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Abstract: The year 2020 was a special one, historically, challenging not only for Romania, but for the entire humanity. This was due to all the changes that occurred because of the restrictions raised by the COVID-19 pandemic. In this context, profit organizations have disrupted their activity drastically up to the barely survival point, being restricted due to the policies implemented by each country, and worldwide restraints. This paper aimed to study the innovation brought in the development and transformation of these companies, namely in Romania during the COVID-19 outbreak. By conducting an analysis about the business approaches in important fields for Romania's development and growth, the authors depicted the decisions leading to innovative technological development and the steps towards digitalization during this crossroad the world is encountering. To identify the decisions taken and assess the impact of technological innovation under the given conditions, the authors have used a questionnaire-based method for gathering and processing relevant data. The main implications of innovation analysed were the business process and strategy shift from physical to online - this helped organizations to maintain somehow their activity during the pandemic. Depending on the business type, some of them even reformed their entire business, specializing in delivery, others adding services, or even producing other goods. Following the information given by the respondents and data considered, most companies have joined digitalization and technological innovation; regardless, the type of innovation, the respondent companies have invested in it, and have managed to face the challenges of 2020. This study can be useful both for academia, and top management staff in organizations, after reading and analysing they could reflect on the transformations made during the pandemic and adapt their strategies. Although the pandemic has generated many negative effects, it has given an energy boost to technological development, proving innovation is becoming an indispensable approach in many areas. Finally, the authors shared their views on the study results related to the decisions made by companies amid a pandemic to keep their business afloat, as well as the extent to which they have implemented technological innovation.

Keywords: innovation, technological development, digitalization, impact of COVID-19

1. Introduction

Following a year of constant change and transformation, 2020 was indeed a turning point for innovation. Humanity had not encountered a pandemic since 1920, however, this time no country was left behind, and the challenges for everyone were significant. Under the recent decades of digital growth and innovation, the world has reached a point of high consumption and technological development. The unexpected crisis triggered by the coronavirus disease 2019 (COVID-19) pandemic brought new challenges for all organizations, profit or nonprofit, and on the other hand, new opportunities for emerging industries and innovation technology. Organizations are being forced to adapt to the new conditions. The capacity to manage complex issues the crisis raised, is forcing the businesses to use innovation, namely, technological innovation to adapt and come with solutions on the way.

In the case of Romania, innovation has not been a priority in the past recent decades, however, the push of the European Union (EU) and the technology development is helping the country to stay afloat. Nevertheless, the COVID-19 pandemic suddenly disrupted the old patterns, and new ones emerged. The context created by the pandemic for technological innovation in 2020 brought lasting changes in human and organizational behaviour for good and bad. Measures for fighting against the pandemic were implemented all over the world. To a large extent, EU countries put into action arduous plans to fight the disease COVID-19 which directly affected markets, economies, and most important people's daily lives.

The current study investigated main aspects on the impact of technological innovation decisions taken by organizations during the pandemic, in 2020, in Romania. The study was developed at the beginning of 2021, on

a questionnaire based, primarily to identify the innovation changes across organizations and main technological innovation decisions taken to survive the crisis. The literature review consists of a context analysis related to innovation, technological innovation, evolution of COVID-19 and measures taken against the pandemic influencing technological innovation worldwide, and in Romania. After using as groundwork for the study, the literature review, the research methodology was explained emphasizing the questionnaire structure designed by the authors. The questionnaire was administered to organizations representatives. Then the following section, the results, and main findings, followed by conclusions depicted from the study. The present paper represents a pilot study investigating some aspects about technological innovation decisions within organizations in Romania, impacting the activity and business structure, during the crisis.

2. Literature review

In the context of COVID-19 pandemic, an unfolding crisis was generated worldwide. This crisis brought unprecedented changes to society, a recent World Health Organization (2020) study indicates that approximately 220 countries and territories across the Globe were affected by the COVID-19 pandemic from December 2019 until March 2021. The worldwide spread of the virus was considered a disaster in many ways; however, this paper is investigating the effects of technological innovation decisions.

According to Younes et al (2020) innovation it represents the idea to create something new from scratch (for example inventions) but also innovation is about improvement, process, and adaptability. Nowadays, most of the existing ideas are redesigned to bring solutions for a certain problem, hence incremental innovation is used.

Technological innovation is the main driver of competitiveness in many industries in Schilling's (2017) opinion. Organizations from many industries rely on products and services developed in the past 5-10 years using processes, methods, and knowledge, researched, and improved continuously. In the context of this paper, technological innovation is understood as the development of new or existing ideas implemented using digital infrastructure, during the pandemic COVID-19.

While advancements in technology have played an important role by speeding up the process of innovation, new digital tools and frameworks became essential to explore more product and services that closely meet the needs of specific customer typologies, achieving differentiation from competitors.

The pandemic became a favourable environment for technology boost, for some industries to bloom, some to adapt and others to disappear. While fighting a pandemic, development speed is crucial, immediate reaction is translated in progress. Most of the time acting fast, opening, and sharing the knowledge is the right approach towards evolution, bringing cross-sector industries collaboration and research projects have specific outcomes. Chesbrough (2020) states that innovation is encouraged when ideas flow among peers. However, Younes et al (2020) considered innovation most of the time is not seen as profitable in the short-term because it involves rather high investments with high risks and few real financial gains for the near future, but the pandemic altered this perspective. In response to COVID-19, profit and non-profit organizations, governments and individuals across the world started to center investments in research and development (R&D).

To beat the pandemic, as stated by Azoulay and Jones (2020), governments prioritized public health implementing measures involving social isolation, and technological solutions. Shutting down industries such as hospitality, transportation, retail, education, and travel led to a high rate of businesses closing, all over the world. The measures were costly, restarting economies could anytime provoke higher spread causing more harm.

For example, Farrugia and Plutowski (2020) affirmed to fight the disease, the information technology industry, pharmaceutical industry, start-ups, and academia, quickly acted and turned their attention to research, new vaccines, immune response to the virus, possible treatments, overall spread, and development of the virus. The pandemic response has produced cross-sector partnerships, reinventing traditional organizational boundaries, creating social systems, and innovating.

The pandemic forced organizations to adopt solutions to reduce the virus spread. Brem, Viardot and Nylund (2021) considered solutions such as flexible work, work from home, teleconferencing, were included in the short-term work strategy responding to different organizational challenges. Hence, technological innovation

facilitated widespread communication and mobility, international collaboration and improvement of medical treatments as claimed by Sampat and Shadlen (2021).

To facilitate technological innovation decisions, for example, in the United States, public-private partnerships offered flexibility in licensing and telehealth regulations to enable virtual healthcare. Initiatives like *COVID HealthCare Coalition* nested expertise and resources from large health organizations, private firms, academic institutions, and start-ups. The crisis has also brought collaborative opportunities to apply artificial intelligence, and machine learning to solve pandemic problems. Researchers in China used artificial intelligence to reveal distinctions between scans of patients with COVID-19 and others with different types of pneumonia, as maintained by Farrugia and Plutowski (2020).

As stated by Papadopoulos, Baltas and Balta (2020) the crisis had a tremendous impact over the economy. A study report by Eurostat shows that the gross domestic product (GDP), market value measure of all end customers' goods and services produced at a specific period, has fallen by 11.2% in the second quarter of 2020 compared with the previous year. The drop was considered the sharpest drop since the observed and gathered data since 1995. For the fourth quarter of 2020, a Eurostat report showed a decrease of 0.5% compared with the previous quarter. Despite the decrease, Romania has registered a GDP growth of 4.8% compared with quarter 3 of 2020.

As claimed by Galí, Gertler, and Lopez-Salido (2021) innovation was a natural reaction for facing the crisis. The first year of COVID-19 pandemic caused a serious decline for some industries, disrupting their activities. Industries such as air transportation, education, agriculture, supply chains, manufacturing, and hospitality industry (travel) dropping significantly in the second quarter of 2020. This decrease is followed by a strong rebound in the third quarter of 2020, with an increase of 11.6% in the EU in quarter 3 of 2020.

Regarding the decisions leading to technological development, there were compared 2 reports by Eurostat, Union, E. (2020) and Union, E. (2021), showing industrial production dropping dramatically in March 2020, by 10.4% compared with February 2020 in the EU, while almost one year later the industrial production in January 2021 compared with January 2020 was up by 0.3% in the EU. Industrial production consists of intermediate goods, energy, capital goods, durable consumer goods and non-durable consumer goods. In this case, even if the economies dropped abruptly, during the pandemic period, the decisions taken to keep the economies afloat showed efficiency.

In Romania's case, the industry production in March 2020 dropped dramatically with 12.4% compared with February 2020, while In January 2021 was observed a 3% decrease compared with January 2020, yet remaining stable compared with December 2020. Concluding, the industry production has increased with approximately 10 percent over the first year of pandemic.

Both GDP and industry production are two indicators showing the economy dynamics within the EU. During the first year of the pandemic the decisions taken have stabilized the environment giving a new pace. Organizations started to adapt to new patterns and gain trust in them, using technology innovation to improve their activity.

Even before the pandemic started, Romania was considered as a "modest innovator" with the lowest innovation performance, 31,4%, in the EU. While the EU average increased by almost 9% compared to 2012, Romania's performance decreased by 5.7%. During the year of 2020, Romania had increased innovation by 0.2%. Bechir (2020) stated that some innovation problems considered in Romania were the human resources and research investments of private companies, which were primarily affected by the crisis.

On March 16th Romania's government introduced the "emergency state", deciding to turn off most activities implying human interaction, letting just healthcare, pharmacies, and other basic need activities free for use without restrictions. People were forced to work from home, and organizations to adapt to new ways of working and dealing with the measures imposed by the government.

A study conducted by the National Statistics Institute of Romania (2020) during the second quarter of 2020, about economy and activities evolution during COVID-19 pandemic showed how Romanian enterprise managers have perceived those at the beginning of the pandemic. Only one of five managers answered the activity in their enterprises will decrease with 25% until the end of March 2020. The rest of 75% were not able to forecast what

the near future could bring. Regarding the activity progress, they stated the uncertainty will increase, and over 48% from the respondents said they cannot estimate at all how the economic activity will evolve. In industry, about a third of respondents mentioned that daily activity will increase during April, by 25% to 50%. The most affected being small and medium-sized enterprises (SME) whose managers have estimated as the main risk, the increase of over 50% or even the closure of the activity. And almost 43% of the respondents said they cannot predict how the number of employees will evolve (stay constant or decrease).

The most visible decisions in organizations during the pandemic were the decreasing turnover, the pause put on activities and the digitalization of their activities afterwards. Many organizations decided to stop their activity for a while and reorganize their strategy concerning their activity and money flows. Even though the framework imposed by the government during the pandemic had to be respected, organizations had to find ways to stay competitive and address the customer, answering their needs for this unforeseen crisis. The technology innovation was a tenable solution.

3. Research methodology

The authors conducted a pilot study concerning the technological decisions taken considering the circumstances created by the COVID-19 pandemic in Romania. The area of technological innovation was affected worldwide due to the fast changes and measures taken by head of the states. In Romania's case, most of the organizations switched from full physical activity to a mix of physical with virtual (online) work. The survey was designed to assess employee's perception about how the activity changed in the context of Romanian organizations and what was the impact of decisions taken considering technological innovation changes. The main variables identified shaping the technological innovation decisions were the COVID-19 pandemic severity of impact, the types of measures adopted by the Romanian government and the innovation frequency before and during 2020. Table 1 is showing the key dimensions assessing the impact of technological decisions, namely the research objectives and the operational variables.

Table 1: Research objectives and operational variables of the study

Research objectives	Operational variables
O1. Understanding the organization background	Organization type
	Industry area
	Average number of employees
	Geographic area
	Main activity changes during pandemic
O2. Identifying the severity of impact regarding the measures taken in the context of COVID-19 pandemic at organizational level.	Measures taken by the company to fight the pandemic effects
	Decisions taken in the context of the pandemic
	Activity type
	The share of activity in online / physical environments
	Organizational level changes in the pandemic context
O3. Identifying the respondent's technological changes decisions assessment that appeared at the organization level.	Respondents' opinion on innovation
	Carried out activities before the pandemic
	Frequency of innovation before the pandemic
	Respondents' opinion on the change of innovation types during the pandemic
	Main innovative activities/processes within the company during the pandemic
	Frequency of innovation during the pandemic
	Person in charge for innovation in the organization
	Technological innovation prevalence (industries / departments)
	Barriers to technological innovation
	Decisions on the technological innovation strategy
	Strategy implementation transfer period to online environment
	Financing sources used to make investments in technological innovation
	Innovation type

Source: Authors' structure depicted from the literature review analysis.

The survey was conducted on organization representatives. The sample of 50 organization representatives were formed by employees from middle and top management from various industries, with knowledge and responsibility about the company they work at. The survey gathered 50 responses. Through the details provided the results can be used for statistical purposes.

The applied questionnaire was developed in 3 parts and 26 questions. The first part of the questionnaire involved general descriptors about the organization. Five questions were formulated to identify organization type, size, and industry. For the second part, the measures tackling the COVID-19 pandemic were identified, using 4 questions using nominal scale and one question measured with the interval scale. The third part was focused on identifying the decisions taken during the pandemic regarding innovation. The structure for the third part covered 12 questions measured on the nominal scale and four questions using interval scale.

4. Results and findings

The first step of the analysis was to understand the organizational environment. In Table 2 is presented an overview, in descending percentage order of the variables describing the organizations profiles depicted from the respondents. The 50 representatives covered the following organization types: corporations (66%), SME (16%), state institutions (10%) and non-governmental organizations (8%).

Table 2: The organizations' profiles as depicted from the study

Organizations' profile		
Organization type	Corporation	66%
	SME	16%
	State institution	10%
	NGO	8%
Average number of employees	Over 500	56%
	Under 30	24%
	100 - 300	12%
	50 - 100	4%
	30 - 50	4%
Work Environment	Urban	84%
	Urban and rural	10%
	Rural	6%

Source: Authors' interpretation based on the developed study.

For a proper understanding of the terms, throughout the analysis the respondents' identity was assimilated with the organization's profiles.

The second question related to the field of activity showed that 26% of the respondents work in the IT industry, 14% in financial services and consulting, 12% in the automotive industry, 12% in education, another 12% in the field services and utilities, 4% in the oil industry, 4% trade, followed by equal percentages of 2% for the construction industry, vehicles for railway transport, pharmacy, gaming, call center, transport and distribution, real estate and market research.

For 66% of companies, the Covid-19 pandemic have not produced major changes to the core business activities. Also, for 18% the basic activity has changed dramatically, for 10% it has partially changed, and 6% of the respondents did not have an opinion about the basic activity changes in the company during the pandemic.

The second part of the survey assessed questions about measures fighting the pandemic in Romania. Figure 1 showing the main measures fighting the effects of the pandemic, 80% of the respondents stated they moved to working from home (WFH), and for 38% the physical activity was partially reduced, hence working both from home and from their offices. Other measures adopted by companies were: multiple use of online applications for a better communication, closure of the physical headquarters, temporary drop of activity, specializing employees in other department fields, increase of delivery activities, offering protection and sanitation materials to employees.

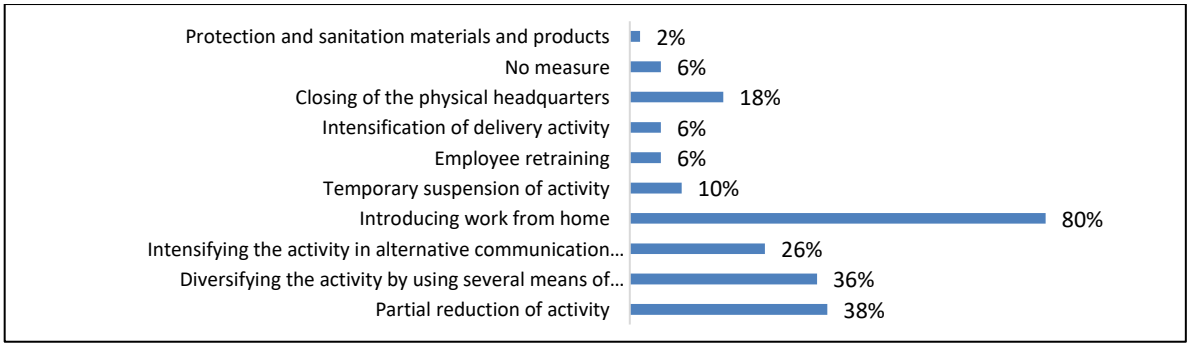

Figure 1: Measures taken by organizations to combat the effects of the COVID-19 pandemic

A decision taken by organizations during the pandemic which had a direct impact over the technology innovation was switching from physical work to virtual (online) work, as seen in Figure 2, 40% of respondents stated they fully switched to online, only 8% remained to work fully physical (going at the workplace every day), the rest of 52% stating that had to combine physical with online work during 2020.

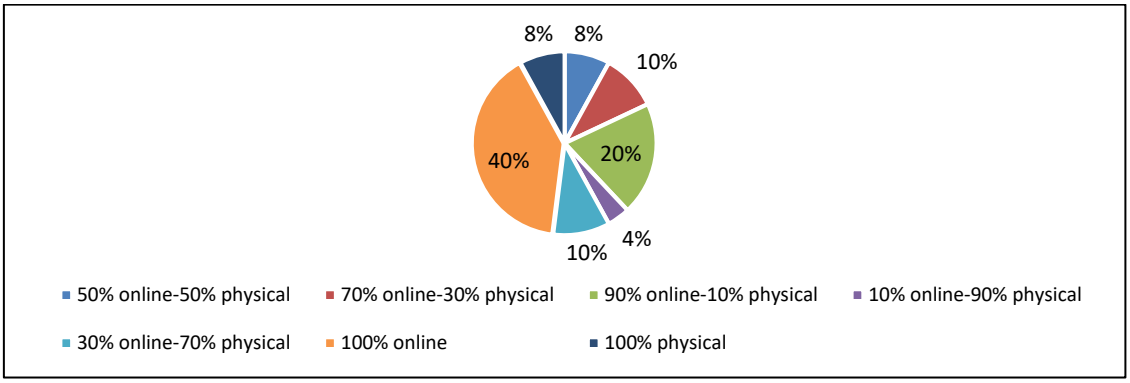

Figure 2: The proportion of activity during the Covid-19 pandemic

As for the activities carried out at organizational level, it is surprising to see that 56% of the respondents said the pandemic did not affect at all the company's activity. While for the others, some decisions about their activity were made, like reformulating the general objectives of the organization for 26% of companies, restructuring the activity for 18%, sending employees to technical unemployment for 14% of companies, reducing staff to cover financial losses for 12% from companies, work schedule decrease for 10% of the companies, but also the reduction of the salary for 2% of them.

The third part of the study showed the innovation decisions taken within the organization. Thus, 78% of respondents stated that the organization they work for, innovates, 22% said their organization does not innovate. Figure 3 is showing the main innovative activities considered by the respondents, prior the pandemic. The respondents stated the main innovation activities before the crisis were improving existing products and services. However as stated by respondents, the innovation frequency in recent past years (2-3 years), was yearly or once at 2 years.

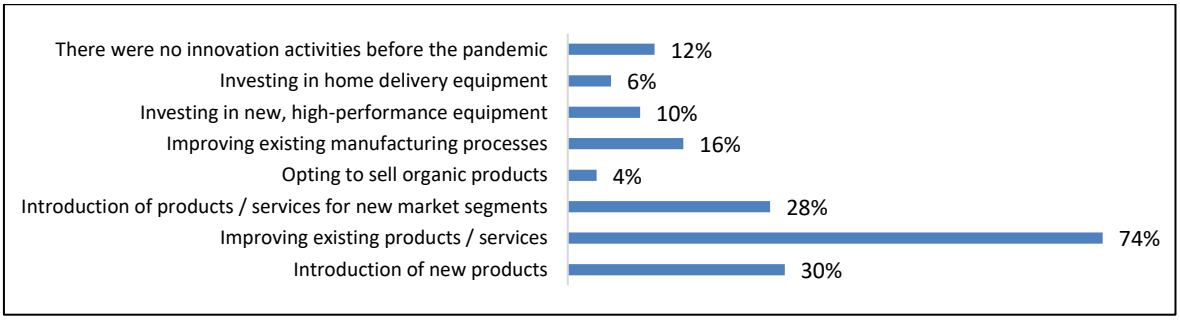

Figure 3: Types of Innovation activities before the Covid-19 pandemic

62% of the respondents stated that the innovation types applied by their companies before the pandemic, changed. Further on, analyzing the respondents stating positive about the innovation type changes, 40.9% of the representatives said the main change was about redesigning products and services, for 22.7% the work processes were redesigned, 20.5% of the companies developed new products, and 4.5% of the companies changed temporarily the object of activity. In table 3 were identified the main 3 innovation decisions related with products and services, depicted from the questionnaire. The main impact at the organizational level was firstly connected with the main activities bringing profit and keeping them afloat, then the technologies used to switch the physical activity to the online one and finally adjusting the main firm strategy to be able to manufacture or sell other goods, hence adjusting the object of the main activity.

Table 3: Organizations' innovation decisions related with products and services

Innovation decisions related to products		**Innovation decisions related to services**	
Developing smartphone applications	20%	Consulting services	18%
Manufacturing of masks, gloves, and coveralls and disinfectant gel	15,6%	Financial services	10,4%
Manufacturing/Selling selfcare products	4,4%	Home delivery	10,4%

Source: Authors' interpretation based on the developed study.

The main take-aways regarding the structure introducing innovation results from the study was that 46% of the respondents consider that the R&D is the main entity, 36% of the respondents believe that the IT department is the one where the technological innovation activity is present the most, 18% believe that marketing or production departments could be the engines for innovation. The final innovation decisions deriving from the study, in the case of 40% of respondents, made by the strategy manager; for 38% by the R&D manager, and the last 22% stated that an employee from marketing or manufacturing department could implement innovation.

The main industries impacted by decisions related with technological innovation during the pandemic, from the respondents' perspective were 56% directed towards the IT industry, 14% in the hospitality industry, 10% in the food industry, 8% in the automotive industry and 6% in the transport and distribution industry.

Main technological innovation barriers were due to the lack of employees with specific skills, fierce market competition, restrictive measures of the Covid-19 pandemic, followed by difficulties in obtaining financial benefits from the Government or lack of domestic funding.

As for transferring the activity to fully online, the process was very fast; thus, for 87% of companies, this stage was completed in about 2-3 months, and for 10.9% in an interval of 3-6 months, and 2.2% in more than 9 months. The daily tasks had to be redefined, and acquire new knowledge reshaping the technologies used.

For those who decided to change the technologies and find solutions to innovate, the main sources of financing were reinvestment of profit in case of 50% of the respondents, 24% stated they used investments from foreign capital, 8% used bank credit, and 6% benefited from state-funded programs.

While facing the pandemic, Romanian organizations decided to build use innovation in their advantage, and make use, in the first place of the existent technology, and later to develop their own, for reducing the impact of the pandemic. As represented in Figure 4, 30% of respondents stated that throughout 2020, product innovation was applied, 28% resorted to process innovation, 16% to organizational innovation, 10% to incremental innovation, 8% to radical innovation, 6% of companies did not innovate, 2% resorted to architectural innovation.

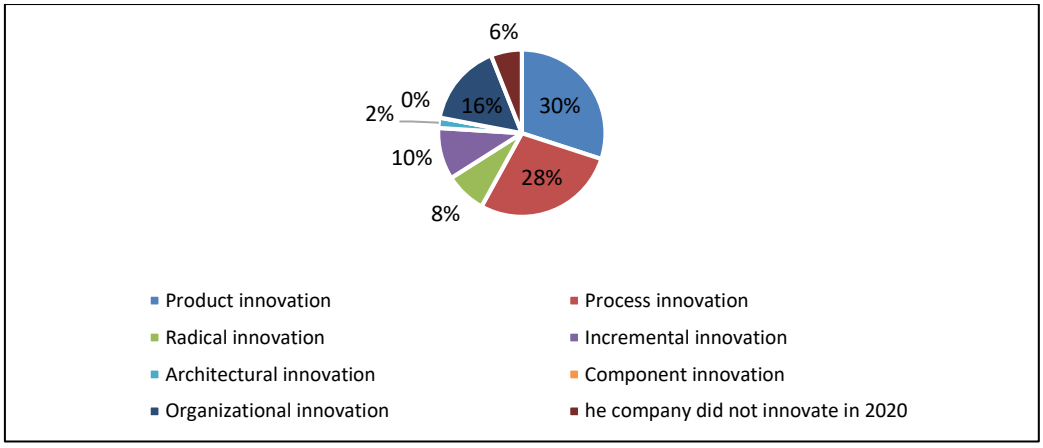

Figure 4: Types of innovation applied by organizations

Legend for figure 4, innovation types as stated by Schilling (2017):

- Product innovation - improvement of older products in the company's portfolio/development of new products based on new technologies.
- Process innovation - improvement/introduction of new manufacturing techniques and technologies used for the production and delivery of products or services.
- Radical innovation - the production of completely new solutions for processes, systems, products, or services, which cause major changes in an industry with the possibility of creating new markets.
- Incremental innovation - adaptation/improvement of existing products/services and/or production and distribution systems.
- Architectural innovation - the development of a product/service by combining components that result in a new “architecture”, practically the total change of the system or the way in which the components interact with each other.
- Component innovation - changing the overall configuration of the system by modifying components at the individual level.
- Organizational innovation - creation/adoption of new ideas, behaviors for the organization, through changes and internal adaptations of the organization.

All in all, this research was subject to several limitations. Firstly, the literature review has covered only the approach about technological innovation, COVID-19 pandemic context commented briefly, the measures fighting the crisis, and some in depth information about the situation in Romania. Also, the purpose was to identify and emphasize the technological innovation decisions helping for development and transformation of Romanian organizations during the COVID-19 outbreak.

5. Conclusions

The pandemic is far from being over, however innovation is thriving. Systems combining resources and infrastructures help solving complex problems simultaneously. This time of crisis represents the momentum to build upon digital advancement. The technology decisions in healthcare, transportation, retail, travel can affect the industry fast. The aim for the post-COVID-19 era is to form a foundation delivering solutions for tomorrow.

Romania have faced many problems within the business environment since the beginning of the Covid-19 pandemic, many businesses have disappeared, and many have reached the brink of bankruptcy. By the end of 2021, Abrihan (2020) was stating that in 2021 the number of insolvencies will rise to 150,000 companies. The study conducted and data gathered showed the high impact of the decisions taken during the pandemic over technological innovation in Romania, from the measures imposing work from home, to redefining activities, and redesigning processes, products, and services.

In the steps towards digitalization, Romania evolved a lot in the previous year. Industries like e-commerce, delivery, logistics adapted their online systems and achieved to get even closer to the customer, another like

education and medicine were forced to move the physical activity to the online, developing new platforms to communicate with the final user. Overall, some technological developments were made to continue the daily activities. Maybe most of them were only improvements of existing platforms, applications, the main goal was to keep the activity alive.

The concept "innovation" has become all-present in industry. From the occurrence of strategical decisions taken by the management team particularly important made in accordance with changes and market requirements, to the launch of the new platforms, applications, products, triggering turning points in the organization lifecycle.

Lessons learned for post pandemic era: to survive in new, unique contexts, crisis situations generated rapidly by today's society, constant adaptability and innovation needed. In the 21st century, reality is changing quickly; while business environment is moving, evolving even faster, and innovation, especially technological innovation, is becoming vital.

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Factors Behind Digital Entrepreneurship Adoption by Egyptian MSEs

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Abstract: In Egypt, micro, small, and medium enterprises (MSMEs) are dominated with micro-enterprises, most of which are in the informal sector. Conventionally, Egyptians have been risk-averse, shying away from starting their own businesses. However, this mindset has recently changed, especially among women and the youth, and more so with the advent of information and communication technologies, particularly social media. This study examines the determinants of engaging in digital entrepreneurship (DE), focusing on women and the youth who are owners of informal MSMEs. The study combines the theory of planned behaviour with the diffusion of innovation theory as a conceptual framework. It tests whether an entrepreneur's characteristics, attitudes, goals, and the innovation attributes of social media, in terms of perceived relative advantage, trialability, and observability have resulted in informal MSMEs' DE adoption. A questionnaire was constructed, and data were collected through phone interviews with 408 Egyptian women and youth male entrepreneurs who own informal MSMEs that only operate online. Results of the statistical analysis reveal the significantly negative impact of self-confidence and boredom on DE adoption. In contrast, making money, connectivity, self-actualization, and minimizing direct costs positively affects DE adoption. Research on MSMEs in Egypt is limited due to the lack of published data, especially regarding the informal ones. Furthermore, studies tackling DE adoption are scarce. This research contributes to the scant literature by providing a modified theoretical framework for future academic studies. The findings will be useful to future entrepreneurs. educators and policy makers to target economic development through MSME creation and the inclusion and empowerment of women and the youth.

Keywords: digital entrepreneurship, MSEs, social media, informal economy, theory of planned behaviour, diffusion of innovation theory

1. Background

Digital entrepreneurship (DE) is becoming an essential trait in new venture creation, more so after the ramifications of the COVID-19 outbreak. It is defined as "a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organization has been digitized" (Hull et al, 2007, p. 5). It is also defined as the process of creating a digital start-up as a new business or within an established firm (Zaheer, Breyer, and Dumay, 2019). It can also be seen "as the reconciliation of traditional entrepreneurship with the new way of creating and doing business in the digital era" (Le Dinh, Vu, and Ayayi, 2018, p.1). This study sheds light on the determinants of DE in Egypt among women and youth males. Research on Internet adoption by businesses has been limited in developing countries (Alam, 2009), especially for small firms/enterprises (Mandal and McQueen, 2012). Social media applications are simple, generally free, web-based, and depend on user-generated contents; hence, these are adopted by businesses primarily to communicate with customers (Mandal and McQueen, 2012). As of September 30, 2020, Facebook had 42.5 million active users in Egypt (Internet World Stats, 2020); according to Kemp (2021), this number has reached 45 million users in 2021. Instagram has also recorded a rising number of 14 million active accounts (Kemp, 2021).

DE has been tackled by only a few research (Kraus, et al, 2018). However, it has gained increasing attention among scholars (Hansen, 2019), mainly because it transforms how entrepreneurs can create new sources of value and wealth (Soltanifar, Hughes and Göcke, 2021). Moreover, DE enables new venture creation, which positively impacts job opportunities and economic growth (Sahut, Iandoli, and Teulon, 2019). Other articles refer to it as internet entrepreneurship, cyber entrepreneurship (Zaheer, Breyer, and Dumay, 2019), digital venture, digital innovation, digital enterprise, or digital business (Kraus, et al, 2018). The use of several terminologies and the fact that this topic is being rooted in several fields make it more difficult for academic research to provide a holistic knowledge base (Zaheer, Breyer, and Dumay, 2019).

Studying ecommerce in developing countries, which contribute to about 40% of the world's population, is still a widely agreed-upon research gap (Rabie, 2013). Research in these areas is needed to support the development

of this sector by enhancing the entrepreneurial capabilities and utilising new digital tools efficiently (Rabie, 2013). In the context of Egypt, small-scale entrepreneurs are the key drivers for economic growth since the mid-twentieth century (Dana, 2000) up to present (El-Said, Al-Said, and Zaki, 2014), in which these small firms play a fundamental role in supporting the economy (Fakhreldin, Ayman, and Miniesy 2020). Nevertheless, country-specific research that studies the entrepreneurs' behaviour, activity outcome (Fakhreldin and Hattab, 2019), and the ecommerce adoption by small and medium enterprises (SMEs) is scarce (Rabie, 2013).

2. Review of the literature

In the digital economy, an increasing number of entrepreneurs participate in the sharing and exchange of information, knowledge, data, and physical goods (Le Dinh, Vu, and Ayayi, 2018). This provides a great incentive to explore and understand the conditions and challenges facilitating or hindering this digital transformation (Hansen, 2019). The literature reports various factors that enhance the social media adoption by entrepreneurs. Alam (2009) showed that owner/manager characteristics have a significant effect on Internet adoption in businesses. Individual personalities (Mandal and McQueen, 2012) and attitudes (Folorunso et al, 2010) of the entrepreneurs who launched microbusinesses play an important role in social media adoption. Moreover, several findings have suggested that prior experiences, resistance to change, education level, and training are all critical factors affecting the Internet adoption (Woodcock and Chen, 2000). These findings were also confirmed by Oliviera and Martins (2011), who determined that the most dominant construct for social media adoption is the owner's characteristics.

Previous research has highlighted several characteristics that also play a significant role: self-esteem, self-confidence, self-efficacy (Macredie and Mijinyawa, 2011; Adam, Jizat, and Noor, 2016), and autonomy. Self-esteem has been described as the pride from having a sense of self-worth (Cyr, 1992). Meanwhile, self-confidence refers to the person's conviction about his/her abilities to successfully execute a given task within an identified context (Moreno, Castillo, and Masere, 2007). Within entrepreneurship studies, self-confidence has been equally related to other characteristics such as risk-taking, capacity to tolerate uncertainty, and locus of control (Dinis et al, 2013). Moreover, self-confidence, along with the need for positive attitude and achievement, has been proven to affect entrepreneurial intention (Ferriera et al, 2012).

Meanwhile, it is to be noted that, individuals are more inclined to engage in activities in which they have a high level of self-efficacy (Adam, Jizat, and Noor, 2016)**.** Self-efficacy has been also associated with technology adoption by Hsu and Chiu (2004), who demonstrated that self-efficacy is positively linked to the owner's intention to use the Internet. Moreover, Hocevar, Flanagin, and Metzger (2014) determined a positive relationship between self-efficacy over social media and the reliability of online information. Mohd et al. (2014) also showed that individuals who have a high level of self-efficacy have the potential to take risks and be innovative. The last characteristic is autonomy, which refers to the amount of freedom and decision rights regarding what, when, and how work is done (Gelderen, 2016). Autonomy is a primary motivator for entrepreneurs (Shane, Locke, and Collins, 2003) to start and run their own ventures (Alstete, 2008).

Many well-established theories are related to technology adoption, such as the theory of planned behaviour (TPB) (Taylor and Todd, 1995), the diffusion of innovation theory (DOI) (Rogers, Singhal, and Quinlan, 2009), the technology acceptance model (TAM) (Davis, 1989; Venkatesh and Davis, 2000) and the Iacovou, Benbasat, and Dexter (1995) model. The TPB is a popular theory in social sciences (Ajzen, 1991) and is an extension of the theory of reasoned action (TRA). TPB proposes the three constructs used to predict an intention to use a certain innovation: attitude, subjective norms, and perceived behavioural control. Attitude refers to a person's (favourable/unfavourable) evaluation of the behaviour; subjective norms form the social pressure to perform the target behaviour; and perceived behavioural control is the extent to which a person feels able to enact the behaviour (Idris, Edwards, and McDonald, 2017). TPB has been applied empirically to explain technological adoption, such as ecommerce adoption in Botswana (Uzoka, Shemi, and Seleka, 2017), where attitude seems to outweigh the subjective norm and perceived behavioural control. TPB was also used to explain the intentions and behaviours of SMEs regarding social media adoption (McLaughlin and Stephens, 2015), by studying the owner or manager's decision-making process. Therefore, the owner/manager's own attitude toward social media best explains his/her decision to incorporate it within business activities (McLaughlin and Stephens, 2015). Thus, studying their attitude and motivations becomes crucial in this context, and employing the TPB fits the purpose of this research. Mandal and McQueen (2012) highlighted that the desire to achieve goals was also an important indicator of social media adoption in microbusinesses, consistent with the findings in the literature

(Venkatesh et al, 2008; Bagozzi, 2008). Goals reflect several attitudes including escaping boredom, looking for job opportunities, reaching wider connectivity, making more money, achieving self-actualisation, and pursuing a work–life balance (Alkhowaiter, 2016; Beninger et al, 2016; Cesaroni, Demartini, and Paoloni, 2017).

Findings confirm a positive relationship between the management's attitude, innovation characteristics, and ecommerce adoption; other factors such as individual e-readiness, government support, and other organisational characteristics (e.g., firm activity, size, and employees' IT knowledge) are also influential. Of the few researchers investigating the adoption of ecommerce within the Egyptian SMEs, Rabie (2013) concluded two different sets of benefits that encourage micro-enterprises to start as an informal online business (Devaraj, Easley, and Crant, 2008). Direct perceived benefits, which include reduced transaction costs and developed information quality and indirect perceived benefits like improved customer service and a strengthened ability to compete (Beatty, et al., 2001). Other factors include growth of the Internet, organisational culture, technical compatibility, and overall cost (Alam, 2009). Based on the DOI, these factors can be summarised in perceived benefits (minimising direct and indirect costs), trialability, and observability.

The TPB has previously been criticised for ignoring SMEs' contextual nature; therefore, Parker and Castleman (2009) suggested that researchers should seek to combine it with other explanatory theories to capture a fuller perspective of technological adoption. Idris, Edwards, and McDonald (2017) agree that TPB ignores factors such as readiness, infrastructure, and SME resources. Meanwhile, Oliviera and Martins (2011) indicated the importance of combining more than one theoretical model in future studies to better understand the adoption of complicated innovation technologies.

The DOI is a popular and frequently used theory to study technology adoption (Alam, 2009). Based on broad psychological and sociological theories, it evaluates how, why, and at what rate new ideas and technology are communicated and adopted (Rogers, 1983; Rahayu and Day, 2015). Through a "process-oriented" perspective (Yu and Tao, 2009), DOI suggests that an individual's decision about an innovation is not an immediate act but a process of innovation decision passes from first knowledge of an innovation to forming an attitude toward the innovation (persuasion) that occurs over time (Peslak, Ceccucci, and Sendall, 2010). The individual/organisation evaluates a new idea and decides whether to incorporate the new idea into ongoing practice (Rogers, 1983). The DOI theory has been previously used to explain the adoption rate of innovations, such as computerised care plan system (Lee, 2004), automatic teller machines in Nigeria (Olatokun and Igbinedion, 2009), 3G mobile phones in China (Zhenghao, Matthew, and Chuan, 2009), and adoption and use of ecommerce activities by SMEs (Idris, Edwards, and McDonald, 2017). Moreover, it has been extensively employed to explain social media usage among users (Peslak, Ceccucci, and Sendall, 2010; Folorunso, et al, 2010) and among SMEs (Ainin, et al, 2015).

Within the context of this study, DOI is applied at the individual level (entrepreneur) in micro-enterprises, where the decision to use social media represents the readiness to adopt DE. Three characteristics of DOI theory (Rogers, 1983) are integrated into the proposed framework, namely, perceived benefits, trialability, and observability. Perceived benefits refer to the relative advantage of or the degree to which the entrepreneur perceives social media to represent an improvement in efficiency/effectiveness compared with existing models. Meanwhile, trialability refers to the experimental capacity with the new technology before adoption. Lastly, observability refers to the ease and relative advantage with which the technology can be seen, imagined, or described to the potential adopter.

Based on the above literature, this present study combines the DOI theory and TPB and the owner's characteristics (Mandal and McQueen, 2012) and examines the determinants that have a significant effect on DE adoption by women and youth male MSE owners in Egypt, as shown in the framework in Figure 1.

The following hypotheses are tested:

H1: The personal characteristics of the entrepreneurs significantly affect the DE adoption.

H2: The attitudes and goals of the entrepreneurs significantly affect the DE adoption.

H3: The perceived relative advantages and benefits of social media significantly affect the DE adoption.

H4: The trialability attribute of social media significantly affects the DE adoption.

H5: The observability of social media significantly affects the DE adoption.

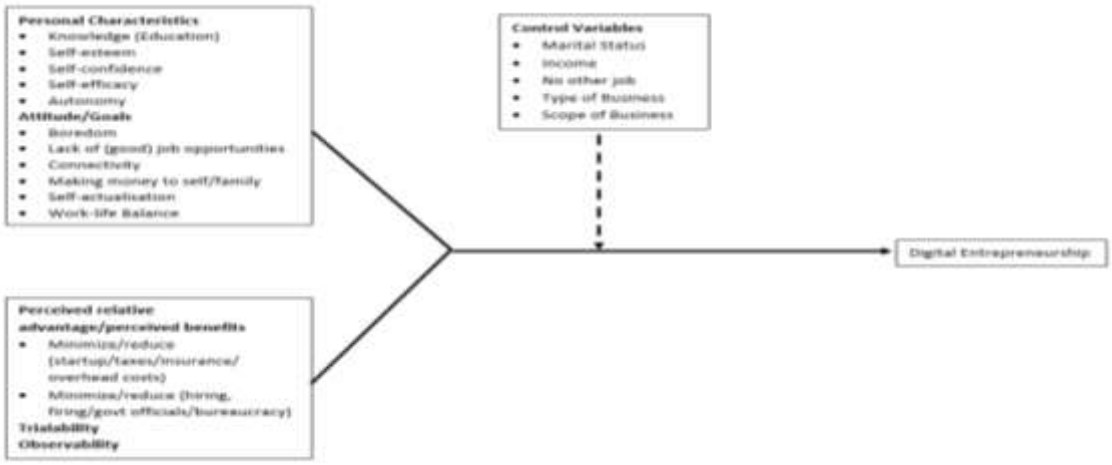

Figure 1: Proposed research framework

3. Methodology

A self-assessment questionnaire was constructed, and data were collected through phone interviews with Egyptian women and youth male entrepreneurs who own informal MSMEs that only operate online. The self-assessment survey is a technique well-respected in the SME literature (Ahmad and Alaskari, 2014). The questionnaire is divided into four sections reflecting the framework of the study, based on the literature and the DOI and the TPB: (1) personal characteristics of the entrepreneur (self-esteem, self-confidence, self-efficacy, and autonomy; (2) attitudes and goals; (3) the perceived relative advantages and perceived benefits, the trialability, and the observability of DE; and (4) biographical information (as shown in Table 1). The survey questionnaire was created in English, translated into Arabic, translated back to English by a professional translator, and reviewed by the research team to avoid misinterpretation and ensure its accuracy (Brislin, 1970). The choice of participants was based on purposive sampling (a non-probability sampling technique) with a pre-determined criterion (Alvi, 2016). MSEs that have been operating online for at least one year have been selected. The owners ought to be Egyptian females or youth males living in Greater Cairo and were willing to engage in the survey (Fraenkel and Wallen, 1996). The survey was conducted before the COVID-19 outbreak, and the total sample consisted of 408 observations. The data were analysed using SPSS version 20.

Table 1: Questionnaire variables

Variables	Explanation	References
Personal characteristics		
Self-esteem	I have good qualities	(Lombardini, Bowman and Garwood, 2017)
	I do things as well as most other people	
	I am equal to my peers	
Self-confidence	I often trust others' decisions over mine	
	I am capable of overcoming challenges	
	I am not afraid of asking for support when needed	
Self-efficacy	I can always manage to solve difficult problems if I try	
	It is easy to stick to my aims and accomplish my goals	
	I can handle whatever comes my way	
Autonomy	I do not have problems in sharing my opinion in front of people	
	I have full control in making personal decisions	
Goals		
Boredom	Boredom or desire to fill time with something beneficial	(Ukpere, Ukpere, and Slabbert, 2014; Alkhowaiter, 2016; Beninger et al, 2016; Cesaroni, Demartini, and Paoloni, 2017).
Lack of job opport.	I did not find a job	
	My other job options were unsatisfactory	
Connectivity	It started by wanting to interact then turned into a business	
Making money	Making money for myself	
	Making money for my family	

Variables	Explanation	References
Self-actualisation	Self-actualisation	
Work-Life Balance	Better work-life balance	
Innovation attributes		
Minimise direct costs	Low start-up and running cost	(Abd El-Fattah, 2012)
	Avoid paying high taxes	
	Avoid paying workers' insurance and un-needed costs	
	Avoid paying overhead costs	
Minimise trans. costs	Allows me to hire and fire workers	(Angel-Urdinola and Semlali, 2010; World Bank, 2013 & 2016)
	Spares dealing with corruption	
	Spares paperwork and bureaucracy	
Trialability	I wanted to try first if it is profitable	(Rogers, 1983; Rogers, Singhal, and Quinlan, 2009)
Observability	I saw other people do it so I could do it	

As indicated in Table 2, the internal consistency coefficient (Cronbach's alpha) reflects the reliability of a scale. Its coefficients ranged from 0.675 to 0.916, indicating good reliability of the questions. Moreover, the inter-item correlation for all items is greater than 0.5, supporting the questionnaire's intrinsic validity.

Table 2: Reliability and validity of variable

Variable	Reliability measure (Cronbach Alpha)	Intrinsic validity
Personal Characteristics	0.677	0.567
Self-Esteem	0.806	0.581
Self-Confidence	0.675	0.509
Self-Efficacy	0.818	0.600
Autonomy	0.816	0.609
Attitude/Goals	0.783	0.584
Social medial perceived benefits	0.679	0.640

Figure 2 displays the demographic variables (education and control variables, gender, and age). To include these variables in the regression model, this study made some changes to allow them to be added as categorical variables, where the category with the most responses took the value of 1, and the other category took the value of 0. The type of business has three categories, and each category on its own might be important to understand how it affects DE. The category of make and sell products is taken as the reference category, and two dummy variables are created for the remaining two categories.

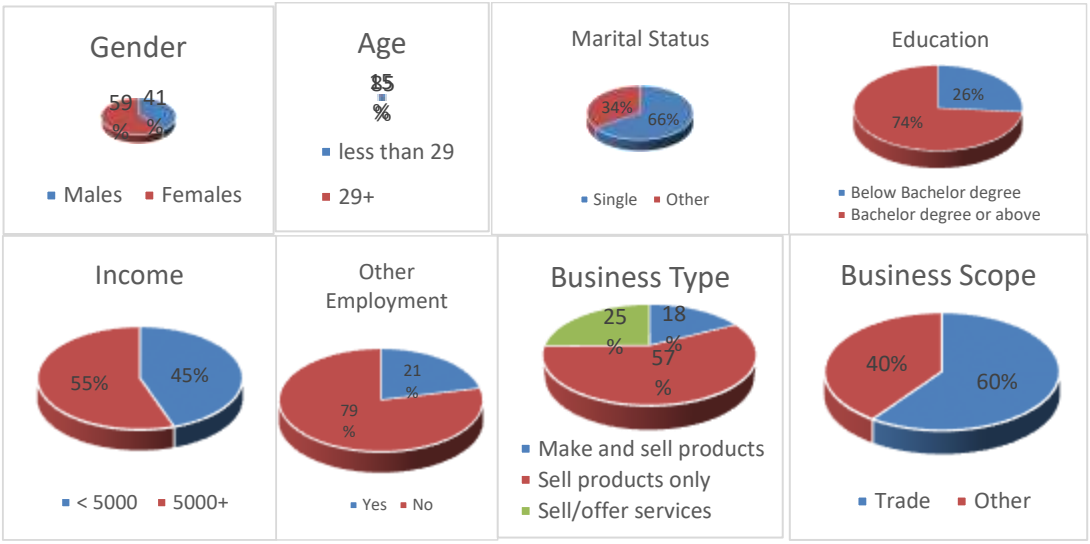

Figure 2: Descriptive statistics for demographic categorical variables

Table 3 shows the descriptive statistics of the dependent and independent variables, where attitude/goals, perceived benefits, observability, and trialability are all based on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Meanwhile, the personal characteristics, except for education, are based on Lombardini, Bowman, and Garwood (2017).

Table 3*:* Descriptive statistics of the dependent and independent variables

	N	Minimum	Maximum	Mean	Std. Deviation
Digital Entrepreneurship	408	1.00	5.00	4.59	0.756
Self-Esteem	408	1.34	3.00	2.42	0.29
Self-Confidence	408	1.34	3.00	2.31	0.39
Self-Efficacy	408	1.00	3.00	2.78	0.38
Autonomy	408	1.00	3.00	2.73	0.43
Boredom	408	1.00	5.00	2.53	1.47
Lack of job opportunities	408	1.00	5.00	4.08	1.16
Connectivity	408	1.00	5.00	2.50	1.49
Making money	408	1.00	5.00	4.61	0.70
Self-actualisation	408	1.00	5.00	4.60	0.60
Work–life balance	408	1.00	5.00	4.41	0.83
Minimise direct costs	408	1.75	5.00	4.32	0.80
Minimise transaction costs	408	1.00	5.00	3.52	0.82
Tribality	408	1.00	5.00	4.30	0.80
Observability	408	1.00	5.00	3.22	1.55

4. Analysis and discussion

The regression model can be written as:

$$\begin{aligned} Digital\ Entrp. = {} & \beta_0 + \beta_1 * education + \beta_2 * self\ esteem + \beta_3 * self\ confidence + \beta_4 * self\ efficacy \\ & + \beta_5 * autonomy + \beta_6 * boredom + \beta_7 * lack\ of\ job + \beta_8 * connectivity + \beta_9 \\ & * making\ money + \beta_{10} * self\ actualization + \beta_{11} * work\ life\ balance + \beta_{12} \\ & * min.direct\ cost + \beta_{13} * min.trans.cost + \beta_{14} * trialability + \beta_{15} * observability \\ & + \beta_{16} * marital\ status + \beta_{17} * income + \beta_{18} * type\ of\ bussiness + \beta_{19} \\ & * scope\ of\ business + \varepsilon \end{aligned}$$

The dependent variable is proxied by a question asking the participants to rate the following statement on a 5-point Likert scale: "If it were not for social media, I would not have started my business." The normality of the dependent variable is checked by employing the one-sample Kolmogorov test, which showed that it is not normally distributed (significance value is below 0.05). However, a sample size of 30 to 50 participants can be used to run parametric tests, especially in multivariate research (Sekaran, 2003); the present study's sample size is 408. Stepwise multiple regression is applied to categorise the independent variables according to their significant effect on the dependent variable. The limitations of stepwise regression were considered through the variance inflation factor (VIF) test, which assured no collinearity problem (Chatterjee and Hadi, 2015) since the VIF values for all variables are less than 10. Therefore, the stepwise multiple linear regression analysis is appropriate to test the hypotheses (Sekaran, 2003).

As shown in Table 4, the adjusted R^2 value is 0.34, indicating that the model could infer 34% of the total variance in the DE variable. Meanwhile, the probability F-statistic is 0.00, signalling the model's soundness and better predictability of the dependent variable than the intercept-only model. Moreover, the value of Durbin Watson is close to 2, indicating no serial autocorrelation between residuals.

For the included variables, self-confidence has a negative and significant effect on DE with a coefficient of −0.141. This might seem surprising, as it is in contradiction with previous studies that concluded that self-confidence is an antecedent of entrepreneurial intention (Macredie and Mijinyawa, 2011). However, this is understandable, as social media usage adds a new dimension to entrepreneurship which is the "online" aspect, that implies changes in the entrepreneurial behaviour associated with it. This also suggests that technology encourages individuals with low self-confidence to have the courage and motivation to be "digital" entrepreneurs. By contrast, minimising direct cost, self-actualisation, making money, and connectivity positively and significantly affect DE with coefficients 0.392, 0.278, 0.149, and 0.057, respectively. This is in agreement with previous literature that proposes that the goals and attitudes have a positive and significant effect on DE (Alkhowaiter, 2016; Beninger et al, 2016). All other independent variables are insignificant, as the p-values associated with these variables are greater than 5%. Similarly, control variables are also insignificant.

The above analysis and findings reveal that individuals seeking more income or money, pursuing connection with others, and needing to achieve self-actualisation mainly engage in DE (Cesaroni, Demartini, and Paoloni, 2017; Ukpere, Ukpere, and Slabbert, 2014). They are driven mostly by the desire to minimise costs, avoid taxes, and reduce overheads (Alam, 2009). Therefore, they are responding to push factors more significantly, and failure to achieve the self-actualisation may discourage the formalisation of these businesses, i.e., leading these economic activities to remain in the shadow of the country's economy.

Table 4: Regression coefficients of included variables with their VIF

	Coefficient (Std. Err.)		VIF
Constant	1.443	***	
	(0.403)		
Min direct cost	0.392	***	1.861
	(0.052)		
Self-actualization	0.278	***	1.283
	(0.058)		
Self-confidence	-0.141	***	1.12
	(0.042)		
Making money	0.149	***	1.618
	(0.055)		
Connectivity	0.057	**	1.43
	(0.025)		
No. of Obs.	408		
R-Squared	0.35		
Adjusted R-Squared	0.34		
F-Statistic	42.44		
Prob > F	0.00		
Durbin Watson	1.80		

Note: ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

Looking at the proposed hypotheses, the following can be concluded. H1, H2 and H3 are partially supported, since not all characteristics (only self-confidence) nor all attitudes and goals (only seeking more money, connectivity, and self-actualisation) nor all perceived relative advantages and benefits (only reducing direct cost) of social media have a significant effect on DE adoption. H4 and H5 are not supported.

5. Conclusion

This study's findings are timely, as they have important theoretical, practical, and policy implications that will complement entrepreneurship theory and support the creation of micro-enterprises in these challenging times. Digital technology can provide many benefits to entrepreneurs, such as faster communication unrestrained from time and space, which effectively makes convenient access to other knowledge networks and global markets (Hansen, 2019). In a broader perspective, DE facilitates the exploration and exploitation of entrepreneurial opportunities because of leveraging digital technologies and digital business models (Soltanifar, Hughes and Göcke, 2021). This entrepreneurial action, aided by digital technologies, has led to the creation and expansion of digital economies (Zaheer, Breyer, and Dumay, 2019).

On the theoretical side, the study contributes to the stream of research that highlights the personal characteristics differentiating entrepreneurs from other groups (Josien, 2008), leading to entrepreneurial behaviour resulting in new venture creation. On the practical side, the study identifies the determinants of DE: self-confidence, self-actualisation, making money, and pursuing connections with more people. Self-confidence is a personal characteristic, whereas the last three are the internal goals/attitudes of the entrepreneur. In addition, minimising direct cost, which refers to the perceived benefits of DE is another determinant. Policymakers should target this group of individuals and provide them with the appropriate training and capacity building to effectively pursue DE. Other players in the ecosystem, for example, the private sector, schools, universities, and NGOs, can have a supporting role.

The number of Egyptian SMEs or even the number of businesses utilising ecommerce has no official statistics. Consequently, the relevant sample size is difficult to determine, depending on the official statistics (Rabie, 2013). Thus, despite filling an important gap on the informal MSEs in Egypt ignored by economists and researchers, this study is more of an exploratory study rather than one that merits generalisations. Only entrepreneurs in the

Greater Cairo area were approached, which does not reflect the whole population of female and young male entrepreneurs adopting DE.

Future studies should target entrepreneurs from all over the country and not just in big cities. This will give a broader view of the Egyptian entrepreneurial landscape. The government, the private sector, and NGOs in Egypt have several initiatives to provide training opportunities and support DE (e.g., Google Maharat). Future research should evaluate these endeavours and examine the significance of the variables identified in this study and if other factors play a significant role. It would be interesting to compare these results with research conducted in developed countries and develop common and different variables.

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Determinants of Innovation in Manufacturing Industry: A Systemic Perspective in Peru

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Abstract: The objective of this research was focused on identifying the determinants of innovation in the manufacturing industry of Peru. A quantitative research based on a non-experimental, correlational explanatory design was followed, using data from 1444 Peruvian manufacturing firms registered in the National Manufacturing Industry Innovation Survey (ENIIM 2015). We estimated a Tobit model for the innovation decision and the amount of investment in annual innovation. The main results showed a global and significant effect of a set of internal characteristics and external factors on the investment decision and the annual amount invested in innovation. Likewise, the size of the firm, the increase in the number of qualified workers, the existence of internal R&D infrastructure as well as the increase in innovation expenses from previous year and the private funds present a positive and significant effect on the propensity of innovation and on the annual amount invested in innovation. In contrast, the lack of competition in the sector have a negative influence on both the decision to innovate and the amount of investment in innovation. These findings contribute to discriminate the most relevant factors to stimulate the generation of Peruvian manufacturing innovation, contributing to the design of stimulus for more effective policies.

Keywords: innovation decision, innovation investment, manufacturing industry, Tobit model, Peru

1. Introduction

During the last years, Peru has increased in the ranking of innovation capacity of the World Economic Forum (2019). However, the internal innovation capacity has showed a slow and complex development, which prevents the implementation of more effective processes (Nolazco, 2020). The manufacturing industry has been characterized by including small, medium and large firms that face limitations to innovate such as the lack of training of human talent, difficult access to sources of financing and government policies that do not promote innovation activities (Ramos and Huarachi, 2017). Despite this, several firms continue to make serious efforts to undertake innovative activities despite their limited potential. For example, according to the 2015 National Survey of Innovation in the Manufacturing Industry (ENIIM) 61.2% of Peruvian manufacturing firms invested in some type of innovation activity. However, Peruvian manufacturing industries have invested very little in internal R&D activities, human talent training and in activities that promote the formation of links to generate innovation. Similarly, the ENIIM results revealed that almost 40% of the firms did not carry out innovation actions, reporting a value of zero investments (Nolazco, 2020).

Investment in innovation in firms can be explained from a systemic perspective, through the interaction of internal and external factors (Durán and Briozzo, 2015; Zemplinerová and Hromadkova, 2012). However, in developing countries there is still a pending task to investigate innovation in the productive sector, given that the development of empirical studies on Peruvian manufacturing industries continues to be scarce. Indeed, as Álvarez and García (2012) suggest, it is imperative to develop more empirical evidence on the factors that promote or hinder manufacturing innovation at Latin American countries scale.

Therefore, this study attempts to close the gap in research based on the following question, what are the determining factors of innovation in the Peruvian manufacturing industry in 2015?

Using data from the ENIIM 2015 survey, the study covers the entire country, constituting a fundamental contribution to measure innovation processes of a technological and organizational nature (INEI, 2017). On the other hand, the research facilitates the generation of knowledge flows for the design and implementation of more effective economic policies that are supported by the most determining factors of Peruvian manufacturing innovation, thus favoring industrial economic growth and thus reducing its dependence on foreign sector.

2. Literature review

From a theoretical perspective, the innovative function of a firm can produce positive externalities regarding the production capacity of other companies, given the fact that knowledge is not fully patentable. Therefore, the investments made in the sector generate, as a secondary effect, new knowledge that is later disseminated

(Buesa *et al.*, 2002). On the other hand, the representatives of the new economy underline the importance of the relationship between institutions and technological innovation. Precisely, the creation of new solutions and technologies, as well as their choice and dissemination, make it necessary to modify the procedural methods and the rules that govern them. According to Veblen (2005), institutions need to change, adapt and evolve along with each technological change or each change in the socioeconomic situation. Therefore, technology is associated both with the quality of the technological equipment, as well as with the experience or technological knowledge of the personnel (Lemanowicz, 2015).

In addition, the OECD through the Oslo Guidelines, pointed out the need to seek sources of technical progress through economic, scientific and innovative policies and the development of a new methodology to measure the results of the scientific research and the application of innovations (OECD, 2018). In this way, the appearance of successive OECD publications coincided with the demand of developing economies, based on knowledge.

However, the evolutionary approach was also criticized under the concept that the role of different actors and their interaction with companies are left aside, within the theory of technological change. In this way, it was necessary to include a geographic perspective in the evolutionary model, in order to analyzed innovation under a systemic perspective (Heijs and Buesa, 2016).

During the last decades, the innovation systems approach emerged, integrating many visions, articulating them according to the degree of connections between the various agents for the creation of business innovations. Similarly, Porter classified the drivers of innovation into internal and external from a systemic perspective. Among the internal factors, the infrastructure, human talent, usable resources for R&D and external factors, the environment or innovation environment, the characteristics of the demand, the related sectors, as well as the quality of the connections between agents (Durán and Briozzo, 2015).

Various studies aimed to distinguish the determinants of the innovative behavior of micro, small, medium and large companies. Abdu and Jibir (2018) using data from 2676 companies registered by the survey of the World Bank in Nigeria between 2014 and 2015 applied econometric estimation of a Probit and Tobit models respectively to analyze the determinants of innovation in large companies. Indeed, the binary Probit regression was used to estimate innovations in products, processes, marketing and organization, since they are dichotomous variables. For its part, the Tobit regression model was used to estimate the determinants of innovation using an average measure of innovation, defined as the sum of the binary variables of product, marketing, process and organization divided by the number of variables used. The results of the Tobit model confirmed that internal characteristics such as the years, the size of the firm, investment in research and development, the formal training of employees, the conditions of exporter had significant positive effects on the innovative trend of the firm. Contrary to expectations, external factors such as foreign investment and the presence of competitors in the main product did not influence the company's innovative trend.

Morris (2018), examined the links between innovation and company productivity in 43 countries using harmonized and comparable data on 40,577 firms surveyed by the World Bank. They used a CDM model, based on a system of structural equations that considered the entire innovation process and, therefore, reflected the decisions of firms to undertake innovation activities, the results of these innovation efforts, and its impact on productivity. In this sense, to measure the investment decision and the results of the innovation efforts, they used a generalized Tobit model. The conclusive findings of these models indicate that the decision to invest in R&D is strongly related to the size, the years of the firms and access to funds. Similarly, it was determined that older companies are more likely to invest in R&D. Similarly, the increase in the proportion of workers with at least a bachelor's degree is positively related to the decision to invest in innovation and also to the intensity which they invest in innovation.

Álvarez and García (2012), focused on highlighting the determining elements of innovation in Colombian manufacturing companies. They used a generalized Tobit model based on data from 2301 companies registered in the Survey of Technological Innovation of Colombia (EDIT II) in 2004. They evidenced that companies with foreign capital, greater size and with access to financing lines, are more likely to innovate, in the types of expenses in innovation evaluated. Similarly, the firms that made an investment in the preceding period have a greater probability of being innovative, showing a significant relationship with investment in innovation. On the contrary, the results of the model indicate that greater competition would discourage investment in innovation, reaffirming Schumpeter's postulates (1942). Similarly, the variables focused on knowledge skills or human

capital, report significance and a positive relationship to the decision to innovate, ratifying the evolutionary theoretical approach to innovation.

From a national level, Nolazco (2020) addressed the binding effects between innovation, productivity and exports in the case of manufacturing firms in Peru. The author used the data from the 2015 ENIIM Survey, through a model by stages that includes an estimate of a generalized Tobit model to measure the decision and intensity of investment in innovation. Likewise, the number of innovations is also modeled using a Tobit type I model. Indeed, the results showed that access to private sources of financing, the presence of qualified workers, the participation with other sectors, the size of the firm, and the capital stock increases both the intensity of spending and the decision to innovate significant. Similarly, market participation was significant in relation to the decision to develop the innovation.

3. Data

For the present study, the data was available from the National Survey of Innovation in the Manufacturing Industry-2015 (ENIIM 2015), which provides information for the period 2012-2014. This survey covers micro, small, medium and large manufacturing companies, with nationwide coverage in the 24 departments and the Constitutional Province of Callao. For the selection of the sampling frame, the survey uses as source the Central Directory of Companies and Establishments of the National Institute of Statistics and Informatics. The registry contains a quantity of 1,684 manufacturing companies, which was refined and matched until obtaining a sample of 1,444 complete records for all the indicators of the variables selected and suggested by the literature (Table 1). Likewise, the applied forms contain categories such as: innovation activities, financing sources, linkages, human talent, economic indicators, intellectual property rights, sources of information to innovate, barriers to innovation and innovation results (INEI, 2017).

4. Method

An econometric Tobit model was estimated, a modeling with censored dependent variables, in which the decision to innovate is a variable that has a fraction of unavailable or null data (Gujarati and Porter, 2011). Thus, the modeling consisted of two (02) Tobit Type I equations, adapted from Álvarez and García (2012).

The model is described as follows:

$$z_n = \begin{cases} 1 & if \quad z_n^* = X_n\beta_{1n} + e_{1n} \geq 0 \\ 0 & if \quad z_n^* = X_n\beta_{1n} + e_{1n} < 0 \end{cases} \qquad (1)$$

$$y_n^* = X_{2i}\beta_{2i} + u_{2i} \qquad (2)$$

Where,

y_n^* = represents the amount of investment in innovation.
z_n^* = is a latent variable that expresses the propensity of innovation.
X_n = is the matrix of the independent variables defined in table 1.
β_{1n} = is a vector of parameters to be estimated in equation 1.
e_{1n} = is the disturbance or error term of the unobserved variables due to specification bias in equation 1.
β_{2n} = is a vector of parameters to be estimated in equation 2.
e_{2n} = is the disturbance or error term of the unobserved variables due to specification bias in equation 2.

Table 1: Definition variables

Variables	Definition
Dependent variables	
Propensity of innovation	Dummy variable, with value =1 if the firm has decided to carry out innovation activities (or similar), 2 otherwise
Invested amount in innovation	Variable that identifies the amount of investment in innovation for the year 2014 in S./ (PEN).
Independent variables	
Size	Variable that identifies the size of the firm.
Foreign capital	Dummy variable, with value =1 if the firm received foreign capital, 2 otherwise.
Qualification of collaborators	Variable that identifies the qualification level of collaborators in the firm, with complete technical studies or more.

Variables	Definition
R&D infrastructure	Dummy variable, with value=1 if the firm presents a R&D department in the firm, 2 otherwise.
2013 innovation expenses	Variable that identifies investments in innovation by firms in 2013.
Competition in the sector	Dummy variable, with value=1 if the firm reports existing competitiveness in the sector or threat of competition, 2 otherwise.
Market conditions	Dummy variable, with value=1 if the firm reports unsatisfied demand in the market, 2 otherwise.
Innovation offer by universities	Variable that identifies the importance of universities in offering sources of innovation ideas.
Innovation offer by experts	Variable that identifies the importance of experts or consultants in offering sources of innovation ideas.
Public funds	Variable that identifies funds received as government support.
Private funds	Variables that identifies funds received by banks or other firms.

In the case of the propensity to innovate model (Z), a Tobit estimate was chosen based on the assumption that the errors follow a normal distribution. Wooldridge (2010) suggests that in models with latent variables the residuals may not follow a normal distribution, but in this case it is irrelevant since the probit estimate provides estimates of marginal effects very similar to those obtained with the Logit model. In this regard, to find the marginal effect of the propensity to innovate (Z) it was necessary to transform the coefficient of the original computational output, for which the following procedure was used:

If X_j is a continuous variable, it was estimated

$$\frac{\delta \mathrm{E}\left(\mathrm{Y}\middle|X_1, \dots, X_j, \dots, X_k\right)}{\delta X_j} = \beta_{\mathrm{j}} f\left(\beta_0 + \beta_1 X_{1+} \dots \beta_{\mathrm{j}} X_j + \cdots \beta_{\mathrm{k}} X_k\right) \quad (3)$$

If X_j is a dummy variable, it was estimated

$$F\left(\beta_0 + \beta_1 X_{1+} \dots \beta_{\mathrm{j}}(c_j + 1) + \cdots \beta_{\mathrm{k}} X_k\right) - F\left(\beta_0 + \beta_1 X_{1+} \dots \beta_{\mathrm{j}}(c_j) + \cdots \beta_{\mathrm{k}} X_k\right) \quad (4)$$

Where:
F is the cumulative standard normal distribution and f is its density function, and c_j is the evaluated discrete value.

On the other hand, the marginal effects of the model of the amount invested in innovation (Y), since it is a continuous dependent variable, can be directly interpreted from the computational output (Gujarati and Porter, 2011). In this framework, for the estimation of the Tobit model, the maximum likelihood method was applied using the Eviews 10.0 program in its censored models routine. Likewise, for the validation of the hypotheses, the evaluation of expected signs and the individual probability of each coefficient were applied.

In addition, the Wald test for the global significance of the model was applied. The test allows testing the H0 ω= 0 against H1: ω ≠ 0 where ω is the probability of the latent or unobserved class. This test is estimated by including as a restriction in H0 that all the coefficients of the model are equal to zero. Under H0: ω = 0, the Wald statistic asymptotically follows a chi-square distribution (He *et al.*, 2020).

5. Results

Based on Tobit estimations, the Table 2 presents the results of margin effects on the propensity to innovation and coefficient to invested amount in innovation.

Table 2: Results

	Propensity of innovation		Amount invested in innovation	
Variables	Coefficient	prob.	Coefficient	prob
Size	0,0079	***	483052,6	***
	(0.015554)		(161949.3)	
Foreign capital	-0,0118		-979963,7	*
	(0.051217)		(523474)	
Qualification of collaborators	0,0509	***	2371443	***
	(0.063083)		(660589.7)	

	Propensity of innovation		Amount invested in innovation	
R&D infrastructure	-0,0482	***	-1102144	***
	(0.040274)		(409620)	
2013 innovation expenses	0,0000	**	0,919355	***
	(1.69E-09)		(0.016802)	
Competition in the sector	-0,0850	***	-2650729,0	***
	(0.036584)		(371228.7)	
Market conditions	-0,0437	***	-886675,7	
	(0.063663)		(637705.6)	
Innovation offer by universities	0,0027		626154,4	***
	(0.019501)		(203825.3)	
Innovation offer by experts	0,0011		-434847,0	**
	(0.018959)		(196829.7)	
Public funds	0,1393	***	2735561	
	(0.178587)		(1805421)	
Private funds	0,1500	***	3296418,0	***
	(0.0449849)		(462927.2)	
Wald (Chi-squared)	492.68	***	3322.24	***
Log likelihood	-1239.526		-15759.75	
Observations	1444		1444	
Standard Errors are in parenthesis				
*** Significance level p<0.01				
**Significance level p<0.05				
* Significance level p<0.1				

The results observed in Table 2 shows that the size of the firm presents a significant (p≤0.01) and positive effect on the innovation decision and on the amount invested. Similarly, the presence of foreign capital was only significant in the amount invested in innovation and only at a marginal level of significance (p≤0.1).

In the case of the level of qualification of the collaborators, a significant (p≤0.01) and positive effect was found, both in the innovation decision and in the amount invested, precisely. Table 2 reflects that by increasing the total number of employees with technical and higher education studies by 1%, increase by 5.09% the propensity of innovation and of S./ 2,371,443 in the annual amount invested in innovation.

Similarly, the non-presence of a R&D department produces a significant inverse effect (p≤0.01) on the probability of innovating and on the amount spent on innovation. In this sense, its effect on the innovation decision is 4.82% and on the invested amount implies a reduction of S./ 1,102,144. Likewise, when studying the effect of innovation expenses for 2013, a positive and significant effect (p≤0.05) was obtained on the propensity of innovation and on the amount of innovation (p≤0.01). Table 2 indicates that an increase of S./ 10,000 in innovation for 2013 period, generates a limited impact (<1%) on the propensity of innovation and S./ 9193 in the amount invested.

The lack of competition in the sector is a significant factor (p≤0.01) that reduces the propensity of innovation by 8.50% and decreases the amount invested in innovation by S./ 2650729. Furthermore, the lack of unsatisfied demand is a significant factor (p≤0.01) that reduces the propensity of innovation by 4.37% but does not significantly affects the amount of investment. Regarding the consideration of universities as sources of business innovation idea, it was not significant with the investment decision, but significant in the amount invested in innovation (p≤0.01). A similar case was observed with external consultants, but with an opposite sign than expected.

Regarding the external factor of public funds was significant in the innovation decision (p≤0.01) and increase positively the propensity of innovation by 13.93%. However, the effect on the amount invested in innovation was not significant. On the other hand, private funds is a significant factor (p≤0.01) whose percentage unit

increase by 15% on the propensity of innovation and increases the amount invested in innovation by S./ 3,296,418.

6. Discussion

The general objective proposed by the research was to analyze the determining factors of innovation in the manufacturing industry of Peru in 2015. The results indicated that there is a global and significant effect of a set of internal characteristics and external factors on the investment decision and the annual amount invested in innovation. The results was corroborated by Álvarez and García (2012) in Colombian manufacturing companies, coinciding with the Porter's approach who classified internal and external innovation drivers from a systemic perspective (Durán and Briozzo, 2015).

Likewise, the increase in the size of the firm from micro to large, the increase in the number of workers with complete technical to higher education has a positive and significant effect on the propensity of innovation and on the annual amount invested in innovation. The results of significance on business size coincide with the theoretical approach of Schumpeter who stated that innovative activity is promoted by large companies and by imperfect competition (Huang *et al.*, 2017). Other study for Colombian context, affirms that large firms have a greater potential to take advantage of their market power and generate extraordinary resources that are used for R&D (Álvarez and García, 2012). On the other hand, the lack of internal R&D infrastructure, significantly reduces the propensity of innovation and the amount spent on innovation. Various studies such as Abdu and Jibir (2018), Morris (2018), Álvarez and García (2012), Nolazco (2020) and Carpio and Miralles (2019) also found that internal characteristics such as the size of the firm, formal training of employees, investment in R&D, present important positive effects on the decision to invest in innovation and also with the intensity which they invest in innovation.

Meanwhile, the presence of foreign capital was not a significant factor in the decision to innovate. However, it explains the annual amount invested in innovation at a marginal level of significance. Therefore, the results they should be interpreted with caution. Abdu and Jibir (2018) and Álvarez and García (2012) found that foreign investment does not have a significant effect on the innovative decision of companies and does not significantly affect the amount invested in R&D, respectively.

The lack of competition in the sector and less access to private financing by companies, negatively influence both the decision to innovate and the amount of investment in innovation. Precisely Morris (2018), Nolazco (2020) suggest that the decision to invest in R&D is strongly related to access to funds.

On the other hand, the existence of a smaller market space and less access to public financing significantly reduce the propensity of innovation. Álvarez and García (2012), and Nolazco (2020) affirm that market participation is significant in relation to the decision to develop the innovation. In addition, a lower supply of innovation from universities significantly influenced the amount invested in innovation. Precisely, greater cooperation between companies and universities has a significant impact on business innovation performance, endorsing the advantages of an open innovation approach (Velez *et al.*, 2019).

7. Conclusion

This research focused on analyzing the determining factors of innovation in the Peruvian manufacturing industry in 2015, finding evidence of a global and significant effect of a set of internal characteristics and external factors on the investment decision and the annual amount invested in innovation.

These findings help to discriminate the most relevant internal or external elements to stimulate the generation of Peruvian manufacturing innovation, contributing to the design of stimulus policies that are more effective. From the economic point of view, we must reinforce activities that promote greater competitiveness and that coincide with good practices for the design of innovation policies suggested by the World Bank (Cirera *et al.*, 2020).

It is recommended to develop related investigations that deepen the training of human talent within firms and how such activity affects key innovation activities such as R&D infrastructure, engineering applications, and marketing actions. In addition, it is also recommended that internally companies can provide incentives and rewards for their human talent innovation. Regarding external factors, it is recommended that industries use

external sources of ideas such as universities and specialized consultants, who can act as providers of technological or organizational innovations. Likewise, it is essential to dedicate financial resources for innovation and take advantage of training.

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At Their own Will: Success and Failure of Airlines After Deregulation

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Abstract: The deregulation of the U.S. air transportation industry in 1978 has served both as an inspiration for subsequent deregulation efforts and as a natural experiment of firm behavior under significant environmental change. The deregulation hurled many airlines into a qualitatively different business context in which they needed to re-establish their competitive positions. Our research aims to identify airlines' characteristics connected with success or its absence in the early post-deregulation era. For this purpose, we use Qualitative Comparative Analysis (QCA) that allows us to observe airlines' characteristics in their combinations, not as independent factors. The method enables us to point out the equifinality in airlines' success, meaning that there were several ways how airlines could have become successful. We find that there were no clear pathways towards post-deregulation success. Yet, the results suggest (with borderline significance) that large airlines that changed their strategy succeeded. Regarding the absence of success, we find three combinations of conditions that explain the lack of success with a relatively high significance. Both results for the presence of success and its absence provides some support for the Icarus paradox. In this phenomenon, a satisfactory past performance causes a strategic persistence that is rendered dysfunctional during and after the breakthrough event and causes airlines' decline.

Keywords: success, deregulation, breakthrough event, Icarus paradox, strategic persistence, qualitative comparative analysis

1. Introduction

The deregulation of the U.S. air transportation industry in 1978 was a breakthrough event that now serves as a natural experiment of firms' behavior and decision-making during the turmoil in the industry. It led to a decrease in flying fares, made flying available to masses, and gave rise to flying as we know it today – as a primary means of transportation over long distances. The deregulation, however, disrupted the industry and changed its status quo. It lowered the barriers of entry in the industry and thus increased the competition. Thus, the change of strategy and business models was necessary for many airlines. Simultaneously, it caused financial troubles to some airlines, brought about increased employee fluctuation, and heated labor relations.

We aim to identify airlines' characteristics related to success or its absence in the early post-deregulation era (until 1983). We employ Qualitative Comparative Analysis (QCA) – a method that stands as an alternative to the correlational approaches widely used in similar studies. QCA is a set-theoretic approach employing configurational theorizing, which allows us to observe success and airlines' characteristics in their combinations, not as independent factors. We expect the QCA to offer a different perspective on the topic than the commonly used correlational approaches. Based on the literature review and our knowledge of the deregulation period, we select several variables (success conditions) that we believe contribute to the occurrence of an outcome – the airline's success. We expect some combinations of an organization's size, type of business model (classical or low-cost), and the number of strikes during the early post-deregulation era to lead to it. Through this research, we strive to enrich and broaden the body of strategic management knowledge. We contribute mainly to the topic of adaptation of organizations to breakthrough events, the role of strategic persistence and strategic change in success during the breakthrough event, and the phenomenon of the Icarus paradox. Icarus paradox states that persisting with previously successful strategies can lead to failure when a breakthrough event occurs and renders these strategies ineffective and dysfunctional.

2. Industry background

2.1 The U.S. airline deregulation

The airline industry was regulated by the Civil Aeronautics Board (CAB) for many years before being deregulated in 1978. The CAB controlled pricing and gave permissions to enter or leave the market. The only way airlines could compete with each other was by improving service and adding more flights to their routes (Audia, Locke and Smith, 2000). Airlines could adjust the frequency they flew each route according to the demand and create

discounts to fill in the seats on their planes that would be left empty under the total price (Thierer, 1998). In 1976 the CAB made a Senate committee report in which presented an alternative of abolishing CAB (as the regulatory body) and establishing laissez-faire policy in the airline industry (Robson, 1976). Deregulation started in 1978 by the Airline deregulation act. The full liberalization, however, did not happen until 1984.

Deregulation's negative side was an increase in concentration, price discrimination, and difference in service quality between the more popular routes and the less frequent ones (Thierer, 1998). Dozens of new airlines emerged, and some of them brought about new business models, thus increasing market diversity (Peterson, 2018). With increased competition in the industry, airlines were forced to cut costs and lower the overheads, which inevitably led to either lowering wages of employees or their layoffs (Peterson, 2018). In combination with a strong position of unions in the U.S. and particularly in the airline industry (Peoples, 1998), this gave rise to strikes and labor negotiations. On the other hand, there was a growth in air travel as more people could afford to fly and new routes were emerging.

2.2 Business models of airlines

The means used to compete in the regulated industry were no longer feasible after deregulation. To succeed, the airlines searched for new ways to compete, which led to the change of their business models (Peterson, 2018). The deregulation period brough about the popularity and the rise of a low-cost business model, which, especially for the new entrants and small carriers, provided a convenient way to compete after the deregulation (Azadian and Vasigh, 2019). The hub-and-spoke system (as opposed to the point-to-point system) has its roots in the deregulation era.[1]

Most carriers can be classified as having either a classical or low-cost business model (Gillen, 2006):

- *Classical business model:* Historically prevailing business model especially favored by the well-established and larger airlines. According to Gillen (2006), this business model can be characterized by using the hub-and-spoke route system, which increases the fixed costs and labor costs. These airlines are also called "full-service airlines" or abbreviated FSA. It stems from the fact that they offer a wider range of services, more than one passenger class, and relatively frequent flights.
- *Low-cost business model:* The rise of the low-cost business model (LCC) is one of the main consequences of deregulation. Low fares and ticket prizes, unbundling, and other low-cost strategies leading to cheaper fares were often the only way by which the new entrants could compete with the established major airlines. Arguably, it is because of this business model that flying services became available to the masses. This business model is characterized by striving to minimize overall costs (Gillen, 2006) and even the customers' comfort (e.g., no free drinks aboard, sacrificing the space in the plane to increase the number of passengers). This way, it drives air tickets' prices down and undercuts other, bigger, and more experienced airlines with the classical business model (Azadian and Vasigh, 2019).

3. Theory overview

Several papers focused on the performance and success of the organization in a relatively stable environment (e.g., Gardiner and Whiting, 1997; Tohidi and Jabbari, 2012). It was established that even though there is not a one-size-fits-all blueprint for success (Gardiner and Whiting, 1997), under normal circumstances, a firm that develops a profitable strategy and persists (sticks) with it experiences success (March, 1991).

However, the literature is not that clear when it comes to the success recipe for overcoming and flourishing during (and after) a breakthrough event in the environment. A breakthrough event is a discrete radical change that tends to disrupt the industry. It may be a (financial) crisis, deregulation of the industry, technical innovations, or even a natural catastrophe or a terrorist attack (Rajagopalan and Spreitzer, 1997). This event disrupts the status quo in the industry. Some scholars refer to such event as a “Kodak moment” since the fall of the former photography market leader Kodak is a stellar example of a failure following breakthrough events (Melvin, 2018). Several historical incidents offer suitable conditions for exploring the effects of breakthrough events and subsequent performance. For example, Audia et al. (2000) place one of their analyses in the discussed

[1] The “hub-and-spoke” system represents a route organization where an airline operates from one main airport (the hub) and each flight between two “non-hub” airports has a middle stop in the “hub airport”. On the contrary, the “point-to-point” system does not require a “hub airport” and the flights are direct (without a middle stop). The “point-to-point” system is often employed by the low-cost airlines as it is cheaper and easier to maintain (Cook and Goodwin, 2008).

setup of U.S. airline deregulation of 1978. Their results suggest that a dysfunctional persistence with strategies that used to work before the breakthrough event led to a decline in the airlines' subsequent performance. Flammer (2018) focused on the financial crisis of 2008 and showed that firms that lowered their capital expenses while sustained their R&D expenses experienced the highest post-crisis performance (albeit in the short run).

One of the biggest challenges that firms face during a breakthrough event is whether to change or persist with their strategy. Finkelstein and Handrick (1990) define strategic persistence as the extent to which a firm's strategic profile remains the same over time. The strategic change is then defined as any alteration of means of doing business. It is often approximated as a change of business model or a strategy but could be as marginal as a change of resource allocation or a route system in the case of airlines. One of the mentioned approximations of strategy is the business model. This term lacks a unifying definition. Based on Johnson et al. (2008), we define it as a set of factors that create and deliver value to the customer and bring revenue streams to the firm. Whether the firm persists with its strategy or change it is contingent to various factors. The organization's size might be responsible for either the structural inertia (Hannan and Freeman, 1989) or the abundance of resources that both might influence the adaptation after the breakthrough event. The study by Kelly and Amburgey (1991) looked into the factors responsible for airlines' failure in the deregulation era and found that bigger organizations are less likely to fail than their smaller counterparts.

The past research has shown that the firms with a good past performance tend to stick (persist) with their strategies more (Lant, Milliken and Batra, 1992; Miller and Chen, 1994). The way to success then might be simplified as finding a successful strategy and persisting with it. However, when a breakthrough event occurs, such strategic persistence is often rendered ineffective or even dysfunctional. This way, the previously successful strategy could be the very reason why a firm experiences a performance decline after a breakthrough event. This phenomenon is known as the Icarus paradox or the paradox of success (Miller, 1992; Audia et al., 2000). However, this logic clashes, for example, with the theory of organizational ecology that states that strategic persistence is a natural choice and safer bet than strategic change at any time, regardless of the nature of the current market or environmental situation (Hannan and Freeman, 1989). The place of strategic persistence in the success recipe is therefore still unclear and needs further research and testing.

4. Methodology

4.1 Qualitative comparative analysis

The QCA method combines qualitative and quantitative research strategies (Ragin, 1987). It is an approach that examines the relationship between conditions (independent variables) and an outcome (dependent variable; Kane et al., 2014). It examines cases as configurations of conditions that jointly lead to an outcome, rather than seeing them as individual factors, which is the case for more abundant correlational approaches. According to Schneider (2012), there are two types of QCA – crisp-set QCA, which operates only with binary sets – cases are either members (1) or non-members (0) and fuzzy-set QCA where cases can also be partial members (e.g., 0.75). In this study, we use the crisp-set QCA. An essential step in this method is calibration, where we define the relevant cases, define the concepts of conditions and outcome, and decide the definition of membership (thresholds) and non-membership of the cases (Schneider, 2012). Calibrated cases form a truth table for analysis that shows all possible configurations of conditions, the number of cases that belong to each configuration, and the cases' consistency. Consistency shows how many cases with similar conditions lead to the same outcome (Kane et al., 2014). The truth table is then minimized into minimal formulas, which are the recipes (i.e., configurations of conditions that lead) to the particular outcome. Finally, the minimal formulas are interpreted using the case and theoretical knowledge.

4.2 Research questions and dataset

In this paper, we try to find answers to two research questions:

RQ1: Which set of conditions led to airlines' success during the U.S. Airline Deregulation (1978)?
RQ2: Which set of conditions led to the absence of success of airlines during the U.S. Airline Deregulation (1978)?

The rationale behind these questions is explained in the theory overview part of this paper. Below we present variable we work with, together with information on their calculation. We derive our dataset from the Civil Aeronautics Board (CAB) historical statistics. The dataset contains data for the years 1974-1983 for 21 airlines

active in this period (although not necessarily for the whole time). Outcome – success: We calculated success as a compound measure consisting of three indicators: means of ROS (operating income/revenues), current ratio (current assets/current liabilities), and load factor (flights flown/available flights) for the years 1982 and 1983. Carriers whose mean ROS was positive, whose mean current ratio exceeded 100%, and whose mean load factor exceeded the industry mean and simultaneously did not go bankrupt in the five years following deregulation were considered successful and calibrated as 1. Based on the literature and our qualitative analysis of the industry and airlines, we chose five conditions that we believe could explain (influence) the success of respective airlines after the deregulation. Table 1 shows the final data matrix with the calibrated conditions and an outcome for each carrier.

Strategic persistence: We calculated strategic persistence following Audia et al. (2000) as a complex measure of seven operational ratios. These are marketing expenses per mile, general expenses per mile, equipment expenses per mile, percentage of scheduled aircraft miles completed, first versus economy class, first-class revenue-passenger load factor, and coach-plus-economy revenue passenger load factor. The final measure of strategic persistence was calculated as a variance of each strategic indicator for the five years following the deregulation, which were standardized, multiplied by -1, and summed. Finally, one (negative) standard deviation from the industry strategic persistence median was considered a strategic change and calibrated as 1. We expect a dysfunctional strategic persistence to lead to a relative failure of the airline after the deregulation.

Size: We calibrated size based on the Civil Aeronautics Board (CAB) reports, which divide the carriers into groups according to the size. The CAB differentiates between majors, nationals, and regionals. In our analysis, we calibrated all major airlines as 1 and the other categories (of smaller airlines) as 0. We argue that big airlines which already held a substantial part of the market share before the deregulation are better suited for the post-deregulation times and expected to survive the shakedown. Business model: Using hierarchical cluster analysis, we isolated three business model sub-groups. We based the cluster analysis on the following variables: total passenger revenues on total operating revenues, total cargo revenues on total operating revenues, total non-scheduled (charter) revenues on total operating revenues, and marketing expenses on total expenses. We then labelled the distinctive clusters as classical business model, low-cost business model, and other business models (mainly charter and cargo). We created a separate variable in the QCA only for the classical and low-cost business models since they form the majority of business models. We believe that they could play the main role in describing success or its absence. Strikes: We highlight the that which in the deregulation period experienced at least one day of strike or other negotiation with employees and expect them to be more prone to failure. We gathered this information mainly from the annual reports of the airlines, the historical press, and airline-labor relations reports (U. S. Government Accountability Office, 2003). We assume that the occurrence of strikes in the observed period could have caused significant problems to the affected carriers and thus prevent them from achieving success.

Table 1: Data matrix

Carrier	Strategic persistence	B.M. 1 classic	B.M. 2 low-cost	Size	Strikes	Future perf. (success)
Airlift	0	0	0	0	0	0
Alaska	1	1	0	0	1	0
Aloha	0	0	1	0	0	1
American	0	1	0	1	1	1
Braniff	0	1	0	1	0	0
Continental	1	1	0	1	1	0
Delta	1	1	0	1	1	0
Eastern	1	1	0	1	0	0
Flying Tiger	0	0	0	0	0	0
Frontier	1	0	1	0	0	0
Hawaiian	0	0	1	0	0	0
Northwest	1	1	0	1	1	0
Ozark	1	0	1	0	0	1
Pan American	1	0	0	1	0	0
Piedmont	1	0	1	0	0	1
Reeve	0	0	0	0	0	1
Trans World	0	1	0	1	0	0
United	1	1	0	1	1	1
USAir (Allegheny)	0	0	1	1	0	1
Western	1	1	0	1	0	0
Wien	0	0	0	0	0	0

Table 2 shows a minimized truth table for the occurrence of success. The last two columns show the count of each configuration and its raw consistency. Raw consistency is one of the parameters of fit and shows to which extent is the specific configuration "unanimous" in terms of outcome. For example, if the same configuration results in the presence of outcome (1) in one case and the lack of it (0) in another, the consistency is 0.5. We can see that the truth table shows only two consistent configurations for success (1). Because of this, it might be more interesting to analyze the negation of success than its presence. The table displays four inconsistencies – contradictions – i.e., cases with consistency lower than 1.

Table 2: Truth table

Strategic persistence	BM1 classic	BM2 low-cost	Size	Strikes	Future perf. (success)	Count	Raw consistency
0	0	1	1	0	1	1	1
0	1	0	1	1	1	1	1
1	0	1	0	0	0	3	0.67
0	0	1	0	0	0	2	0.5
0	0	0	0	0	0	4	0.25
1	1	0	1	1	0	4	0.25
0	1	0	1	0	0	2	1
1	1	0	1	0	0	2	1
1	0	0	1	0	0	1	1
1	1	0	0	1	0	1	1

5. Results

The following tables show the results of logical minimization – minimal formulas. First for the presence of success and then for the absence of it. We chose the intermediate solution for interpretation as it offers a middle path between the unrealistic and trivial parsimonious solution and the complex solution, which contains the so-called difficult counterfactuals, which might be tricky for interpretation. The table also covers the parameters of fit: coverage and consistency for every minimal formula. Under the table, we can see the specific airlines covered by the formulas of the corresponding number and the parameters of fit for the entire solution.

In the analysis of the presence of success, the logical minimization yielded only two minimal formulas, which offer a poor coverage of cases in the dataset. Two conditions present in both minimal formulas are size (major airline) and the lack of strategic persistence (strategic change). We could, therefore, with a very moderate level of generalization (considering the low coverage of the solutions), say that bigger airlines that changed their strategy experienced success in the deregulation period. This would support the Icarus paradox. However, the occurrence of these conditions in the dataset is too low and the number of contradictions relatively high.

Table 3: Solution for success[2]

	Solution	Raw coverage	Unique coverage	Consist.
1.	~BM1 classic * BM2 low-cost * Size * ~Strikes * ~Strategic pers.	0.14	0.14	1
2.	BM1 classic * ~BM2 low-cost * Size * Strikes * ~Strategic pers.	0.14	0.14	1
Solution coverage = 0.29, Solution consistency = 1				

Carriers that match presented configurations:

1. USAir (Allegheny)
2. American

More sense can be made of logical formulas in the solution for the absence of success (Table 4). Here the logical minimization yielded five solutions with relatively high coverage (0.86 in overall). Of these, the first three are of particular significance because of their higher coverage. The first configuration indicates the smaller carriers with neither low-cost nor classical business model that did not experience strikes. This might suggest that the

[2] The asterisk (*) denotes the Boolean operation of “AND” and the wave dash (~) denotes negation (absence).

alternative business models (mainly charter and cargo) were hit harder or that the lack of particular strategic direction might have caused the failure (absence of success) of airlines. The following two configurations show the cases of airlines with a classical business model. Contradictory results were obtained for conditions of strike in these configurations. In configuration number two, these are the major airlines that did not experience strikes. In case number three, they experienced strikes and exhibited strategic persistence. The contrast in the effect of strikes might mean that strikes could work both ways and serve either as a negative event that weighs the carrier down or as a positive warning sign implying that strategic change is suitable. The third solution (as well as the fourth and fifth) show a presence of strategic persistence as a factor contributing to the lack of success. This provides some support for the Icarus paradox hypothesis – in these cases, the strategic persistence was dysfunctional and led to the carriers' lack of success (or failure).

The single condition common to all the minimal formulas is the absence of a low-cost business model. For example, the failure (or at least the lack of success) can be partly attributed to the use of a different than low-cost business model. This might mean that the low-cost business model was more suitable for survival during the deregulation – potentially because it was favored by the new environment. In the analysis of necessary conditions, the lack of a low-cost business model shows a consistency of 0.86, which indicates a strong influence of this condition. However, it cannot yet be deemed a necessary condition as this would require consistency of at least 0.9 (Ragin, 2008).

Table 4: Solution for the absence of success

	Solution	Raw coverage	Unique coverage	Consistency
1.	~BM1classic * ~BM2lowcost * ~Size * ~Strikes	0.21	0.21	0.75
2.	BM1classic * ~BM2lowcost * Size * ~Strikes	0.29	0.14	1
3.	BM1classic * ~BM2lowcost * Strikes * Strategic pers.	0.29	0.29	0.8
4.	~BM1classic * ~BM2lowcost * ~Strikes * Strategic pers.	0.07	0	1
5.	~BM2lowcost * Size * ~Strikes * Strategic pers.	0.21	0	1

Solution coverage = 0.86, Solution consistency = 0.86

Carriers that match presented configurations:

1. Airlift, Flying Tiger, Reeve, Wien
2. Braniff, Eastern, Trans World, Western
3. Alaska, Continental, Delta, Northwest, United
4. Pan American
5. Eastern, Pan American, Western

6. Discussion

The analyses contained in this paper suggest that the nature of success during this breakthrough event is hard to disentangle, at least by the chosen methodological setup. Therefore, the first research question – "Which set of conditions led to airlines' success during the U.S. Airline Deregulation, 1978?" cannot be fully answered. The reason may be that (1) the conditions chosen for this outcome cannot explain it (this is supported by the low overall coverage of the solution, only 0.29) or (2) the success itself cannot be explained on this general level. It is possible that the success would be better examined on a level of individual carriers using qualitative methods such as case studies or content analysis (for example, of annual reports or the media coverage). Another possible explanation of this result might be the small number of airlines deemed as successful. This reflects the reality as the success rate of the airlines in the first five years after the deregulation was low. Still, the analysis of success factors also shows (although with poor coverage) that the major airlines which changed their strategy were successful after deregulation.

The second QCA analysis examining lack of success (failure) shows a better pattern than its presence. The three most covered configurations for lack of success are:

*~BM1classic * ~BM2lowcost * ~ size * ~Strikes*
*BM1classic * ~BM2lowcost * Size * ~Strikes*
*BM1classic * ~BM2lowcost * Strikes * Strategic persistence*

These configurations provide the answer to the second research question – Which set of conditions led to the absence of success of airlines during the U.S. Airline Deregulation, 1978? Not exercising the low-cost business model was the single biggest mistake that caused a lack of success to the carriers. Furthermore, strikes might be a double-edged sword – for some airlines, their presence in the configuration led to the lack of success. For others, their absence led to the same result. This suggests that strikes could work either as a weigh-down or as a warning sign, bringing a firm to the strategic change. Finally, we found some evidence for the second part of the Icarus paradox hypothesis – persistence with strategy (which previously worked) during a breakthrough event might bring a performance decline. These results are in line with Audia et al. (2000).

6.1 Limitations and future research

We consider the short period of analysis as one of the limiting factors of this paper. We assessed five years after deregulation, which is possibly too short period for the applied strategies of carriers to start working and for the "dust to settle" so the winners and losers can be seen. Moreover, the deregulation spanned more than just one year, and the complete "liberation" took place as far as 1984.

Second, the dataset used for the analyses contains only 21 airlines which is arguably too small for the significant pattern to be found or for the employment of more conditions (it is recommended that the QCA dataset contains 4-times more cases than conditions). On the other hand, QCA is well suited for the smaller datasets (10-100 cases; Rihoux and Ragin, 2009).

Finally, the calibration of conditions and selected thresholds is subjective, and therefore they might not reflect what was intended. Furthermore, the choice of conditions per se might be incorrect. Since the small count of cases limited us, we could not have used more conditions of which some might have been more explanatory. It is also possible that entirely different conditions or their combination would produce better results. Finally, some of the selected conditions may be more of a continuum than a binary value which is not well reflected by the crisp set QCA. Because of this, QCA using fuzzy sets could also be used to emphasize the continual nature of some variables.

In future research, we see the potential in the robustness check (replication) of the results with different and more recent events such as 9/11 2001 (terrorist attack in New York), the financial crisis of 2008, or even current COVID-19 pandemics. Industry other than airline might be used for the analysis as well. For example, financial institutions during the financial crisis of 2008 or healthcare organizations during the COVID-19 pandemics. However, the breakthrough event does not have to be linked to the industry (for example, an adaptation of SME during the Financial crisis 2008 can be examined). Also, alternative conditions to ours could be considered. Conditions such as top managerial cognitions and characteristics (e.g., CEO tenure, managerial team diversity), prior experience, resource allocation diversity (e.g., marketing expenses, capital expenses, R&D expenses), performance feedback (past performance, social and historical aspirations) may be more suitable conditions to explain success. Furthermore, the qualitative designs might unveil and help better understand the nature of success and provide new testable propositions.

7. Conclusion

In our research we explored the success conditions of U.S. airlines during their deregulation in 1978. We did not find sufficient recipes for the success. We, however, unveiled some of the factors responsible for the lack of success. Our paper also provides some evidence for the Icarus paradox's existence, e.g., the occurrence when a previously successful strategy is rendered ineffective under the conditions of a breakthrough event. The very reason for a good past performance causes the decline of performance under the new status quo brought about by the breakthrough event. We conclude that further research and robustness checks are necessary to enrich the current knowledge.

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Growing Niche Business Through Innovation: A Family run Open Farm in Ireland

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Abstract: This case study presents an analysis of Leahy's Open Farm, a family business that has continuously reinvented itself, since its launch in 1996. The open-farm industry in Ireland is a niche that faces many regulatory, organisational and economic challenges. This case study presents an overview of the challenges and potential for this growing market. Challenges include; rising insurance costs (33% increase) and dealing with (50% reduction in revenue in 2020) and recovering from the economic impact of COVID-19 restrictions. Leahy's have been able to develop the business by adding new revenue streams, nurturing employee skills, harnessing their competency base and consistently applying an organisational learning mind-set. A firm innovation capability perspective is employed as a theoretical lens to analyse Leahy's strategic intent, use of resources, processes and mind-set that enable them to develop the business. Primary and secondary data collection methods were employed. Semi-structured interviews with Leahy's open farm leadership and staff as well as ethnographic observations. A literature review of open-farm publications and interviews with an Irish state agency in agriculture, horticulture and food was conducted to develop an overview of the open-farm industry in Ireland. A key finding from this study is the observation that the open farm industry in Ireland is not regulated or supported by a state body and falls between two government departments (Agriculture & Tourism). In the UK however, the National Farm Attraction Network (NFAN) provides supports and collects data on open farms. NFAN have been helpful to Leahy's in the absence of an Irish network. This lack of support is likely to result in an inconsistent approach being taken by open farms in Ireland, and results in an un-coordinated approach to managing and promoting the market. A roadmap for open farms (Figure 1: Roadmap for Open Farms in Ireland post COVID-19 Economic Crisis) has been suggested to aid these businesses to strategically plan for the future. Leahy's are an example of an open-farm that has consistently sought to be a leader in this marketplace and has demonstrated an admirable capacity to innovate through fostering an open and innovative environment. This case study demonstrates how firm innovation capabilities can be applied to analyse the innovation capacity of small family businesses and sets an agenda for increased research and development for the open-farm industry in Ireland.

Keywords: family business, innovation capabilities, open farms, business challenges

1. Introduction

Getz et al. (2004: p. 5) define a family business as 'any business venture owned and/or operated by an individual, couple(s) or family'. From humble beginnings, Eddie and Eileen Leahy supported 7 children and built up a successful family farm. The Leahy's took a brave decision in 1996 and opened their traditional dairy and pig farm to the public and hence 'Leahy's Open Farm' was launched. Initially, the farm showcased old agricultural machinery and equipment. Soon after they added children's slides and a coffee shop, where freshly made home baked goods were on offer daily to cater for the growing number of visitors coming to their Open Farm. The farm has since grown from strength to strength and attracts thousands of visitors every year to this East Cork tourist attraction. According to *Wilson (2007)* open-farms operate on a pragmatic basis and in addition to family needs, various factors such as increasing overheads e.g. insurance, the need to re-invest, update and innovate affect an open-farm's competitiveness in the marketplace. Leahy's has been able to achieve consistent growth and ensure the delivery of high-quality products and services thanks to their strong innovation practices. New revenue streams are continuously being developed as a result of Leahy's intentional innovation practices, and from emergent innovative behaviours that occur as a result of their adhocracy organisational structure.

2. Company background

In 2014, their son (Donal) and daughter-in-law (Teresa) took over the running of the open farm and have added significant value to the business with the introduction of new product lines and services. The new owners have gained extensive experience in managerial and agricultural roles and bring this knowledge into the day to day running of the business. Over the last six years, they have added an Ice Cream and Chocolate Factory, increased the range of indoor and outdoor animals, extended the museum indoor and outdoor activities, such

as an indoor soft play area and an outdoor digger park. They have also purchased eight acres of land to allow for expansion of this private limited company. The business is funded through a number of revenue streams; annual memberships, pay as you go rates, tours, parties, seasonal events, onsite services and product sales.

On average, seasonal events, such as Christmas, generates approximately 33% of annual revenue and the summer season generates approximately 50% of annual revenue, subject to weather conditions. The ice-cream factory generates approximately 25% of annual revenue and generated €80,000 in revenue in its first year of trading. The sales of their ice cream have increased year on year.

The Open Farm welcomed 78,000 visitors in 2019 and estimated to increase by 9% to 85,000 in 2020. However, due to COVID19 this is estimated to fall to 60,000 visitors. The business has introduced a number of cost-saving measures to ensure the viability of their business. This will be discussed further in section 6 (challenges facing the business).

While a key customer for the open farm is families, the business also targets active retired groups, family events (birthdays, communions, and confirmations), school tours and bus tours. They offer group rates with added extras of a guided tour, an open farm quiz, bastible making and four course lunch. Due to the seasonal nature of their business, the number of seasonal employees fluctuate. Generally, they have up to 12 full-time employees, some who are on reduced working weeks and at weekends they require up to 20 staff. During busy periods, such as the summer and Christmas, they have up to 45 staff rostered. This is a family run business with several family members employed and it also employs students who live locally.

Through the financial support of SECAD (supports rural development and enterprises through government and EU funding), Leahy's Open Farm has built a new car park, new equipment for the ice-cream and chocolate factory, a climbing frame, developed the adventure trail, soft play area and crazy golf. The business was awarded funding recently from the LEADER programme, following a competitive process, who financially support community led projects and rural enterprise development across the country. This funding will be used to build a Leprechauns castle on the farm, which is intended to be an inclusive play area that is both wheelchair friendly and accessible to all. This new addition to the extensive range of facilities already on offer, will be launched in summer 2021.

3. The open farm industry in Ireland and UK

Leahy's advised there is no data or umbrella organisation for the Open Farm industry in Ireland and this was confirmed by Teagasc. Teagasc is a national body who provides advice and training to the Agriculture and Food Industry in Ireland (*Teagasc.ie - About,* 2020). Teagasc argued it falls between two government departments, Department of Agriculture, Food and the Marine and the Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media, with no department taking responsibility. Therefore, there is very little information available on the size of the market, number of competitors etc. Leahy's have looked to the UK for ideas on developing their business and have made many trips to open farms operating in the UK.

There is an umbrella organisation in the UK, the National Farm Attraction Network (NFAN) and Leahy's have found this organisation very useful. NFAN has over 200 members and provides professional support, assistance and organises regular networking events. NFAN inform their members about EU funding and grants but given the UK will leave the EU on the 31st of December 2020, access to EU funding is now in doubt. During the 1990s open-farm attractions were the fastest growing type of visitor attraction in the UK and Northern Ireland *(Wilson, 2007).* NFAN estimate that there are approximately 400 farm and rural attractions in the UK, welcoming 45 million visitors a year. 219 of these farms are members of NFAN and have approximately 25 million visitors annually. NFAN members buy local produce, educate local school children, as well as provide the regions with excellent leisure destinations, which contributes greatly to the UK tourism economy (*About the National Farm Attraction Network*, 2020).

NFAN carried out a survey in 2020 and found the average farm park welcomes 113,821 annual visitors, employs 62 people and has a turnover of approximately £1.4 million. Cumulatively, this generates over £300 million for the rural tourist economy in the UK each year. NFAN's members support approximately 13,500 jobs, which equates to over £100 million in salaries (*About the National Farm Attraction Network,* 2020). Although no such data on this industry exists in Ireland, it is very clear the importance of this sector to the UK rural tourism

economy. Open Farms would be part of the Agri-Tourism sector and no economic reports have been done on this industry to establish its value to the economy.

Caslin, (2018) defines the Agri-Tourism industry as a farm that offers accommodation, food and other attractions connected with authentic real life but very little is available on this industry in Ireland. Examples of diversification projects in the Agri-Tourism sector include Glamping/Camping, conversion of old farm buildings for tourism accommodation/amenities and open farms/pet farms. The most successful projects complement the existing farm business. Caslin observes that Agri-Tourism can help to regenerate peripheral regions and help small farms who are suffering from declining agricultural viability. Agri-Tourism is part of rural tourism and Rural Tourism is defined as 'tourism in rural areas' (Delheure *et al*., 2014, pg. 179) and is outside the major urban centres, whereas rural tourism in the EU context "provides between 10% and 20% of rural income and employment" *(Industrial Heritage and Agri/Rural Tourism in Europe, 2013, pg. 9).*

4. Innovation capabilities of Leahy's Open Farm

As can be observed in section 2, Leahy's Open farm are an organisation that are constantly innovating and developing new revenue streams that allow the business to grow. These innovations occur thanks to intentional practices, and from emergent behaviour due to the adhocracy organisational culture. An organisation's ability to innovate can be linked to the practices of employees across the organisation as well as internal and external processes that support organisation innovation. Nada and Ali, (2015) build on this concept to propose a holistic conceptual framework for service innovation capability, which focuses on themes including *managerial capability, operational capability, strategic capability and adaptive capability.*

A useful thematic perspective on innovation capabilities is presented by Carlgren, (2013), which focuses on the following themes: Strategic Intent (*Organisation Vision*), Resources (*Knowledge and competency base, technology, networks and relations*), Processes (*Organisational structures, managerial systems, generative processes, ways of working*), and Mindset (*values, norms, culture, how decisions are taken)*. The intent to categorise the practices and processes associated with a firm's innovation capability can provide insight into how to better manage the activities that lead to enhanced innovation, and may also provide an insight into processes that can be implemented to systematically build innovation capabilities within the organisation (Börjesson, Elmquist and Hooge, 2014).

In the case of Leahy's open farm, it became clear from speaking with the management (Teresa), this SME demonstrated an excellent aptitude for activities and processes associated with strong innovation capabilities. The Roadmap for Open Farms in Ireland post COVID-19 Economic Crisis (Figure 1), highlights that the nurturing of employees' skills, the harnessing of a competency base and becoming a learning organisation are strategies for building on innovation capabilities within an organisation. These three elements are discussed further below.

4.1 Nurturing skills

Leaders in organisations can create conditions under which individual's innovation capacity can thrive (Surie and Hazy, 2006). An important element of this is for leaders in SME's to consider how they nurture the experiences and self-efficacy of their staff in respect of solving problems for the organisation. Leaders should focus on two dimensions to nurture innovation skills.

First, leaders should focus on the breadth of experiences that contribute towards problem solving – with (Ancona and Caldwell, 1992; Dougherty and Hardy, 1996; Cohen and Levinthal, 1990) linking a diversity of experiences to more effective innovation. Leadership in Leahy's achieve this through their open and empathetic management style. Teresa expressed a desire for all employees who work with them to feel a sense of meaning and direction with their career's, with this mind-set applied to both full and part-time staff.

Second, leaders should focus on the depth of expertise in particular disciplines, with the depth of expertise being significantly linked to increased innovation capacity (Boh, Evaristo and Ouderkirk, 2014). Leaders can achieve this by providing individuals with support to pursue further education and certification, or by allowing employees greater responsibility in their areas of interest within the organisation.

The coffee shop on Leahy's premises is an example of a revenue stream, which has benefitted from this, with Leahy's providing support for Susan the coffee shop manager to pursue further education. The coffee shop was originally an informal tea, coffee and 'bake of the day' experience, but Susan has since developed a list of innovations and new revenue streams including a full-menu, take-away meals and picnics, catering for a children's menu, and individuals with gluten free (coeliac) and vegetarian requirements, as well as adjusting the menu to change to market preferences by developing healthier meal options. These new revenue streams helped to justify and pay for investment in a full commercial kitchen, which will in turn allow for increased quality, capacity, and revenue from the coffee shop. Furthermore, by delegating responsibility of management of the coffee shop, Teresa has time to shift her attention from operational level activities to tactical and strategic tasks.

4.2 Harnessing the competency base

While it is important to nurture individuals, innovation is typically a social process that requires the collaborative exploitation of individual skills (Wenger, 1999). Harnessing the competency base, asks for leaders to mindfully take stock of the skills that are available within your organisation and to collaborate with these individuals to find ways to add value to the business.

A key element to Leahy's continued development of new and exciting revenue streams has been their ability to incorporate the unique competence base of the family and employees. For example, during a regularly scheduled ideation session, a suggestion from a part-time employee to run ecology trips was further developed by Matt, the full-time yard manager. Matt, building on his degree in environmental science, developed an educational ecology and biodiversity school trip offering aimed at students studying Agricultural Science. Ecology elements of this trip offering have also been integrated into their summer camp and orienteering experiences, helping provide a competitive advantage for these packages.

This mind-set and approach are extended to encouraging part-time employees to apply their unique competencies. A part-time employee studying marketing in college was given range to apply her skills to promote Leahy's Open Farm. The employee used their knowledge of digital marketing to effectively develop their website and social media presence. Since the COVID-19 lockdown in Ireland, the website has since become an extremely important revenue stream, allowing the Open Farm to reach customers who are no-longer able to physically visit the farm.

This ability to harness or exploit the competency base requires an open mind-set, and the ability to delegate responsibility and trust your employees to have the best interest of your organisation in mind. These practices contribute towards a culture of innovation within the organisation that can lead to emergent innovation behaviour that could not have been predicted if management did not harness their employees' competencies.

4.3 Organisational learning

An open mind-set and organisational culture should also be extended to how you take information from your organisation's activities and use it as feedback to contribute towards incremental or radical innovation within your organisation. This perspective is consistent with the idea of organisational learning. Organisational learning can be viewed from several perspectives, (t*he individual, how decisions are made, corporate culture or management systems* (Drejer, 2000), but in the context of innovation it can be useful to take a user-centric view of organisational learning. Do you actively seek feedback from your customers, are there clues in how your customers interact with your business that can be used as feedback? Can your customers contribute towards the incremental improvement of your current offerings or are there unmet desires that could lead to radical innovation? Do you have processes to capture and codify these learnings to create organisational knowledge? (Rudawska, 2013). In the case of Leahy's open farm, the culture of management contributes to their ability to capture learnings and act on this knowledge. Informal processes are integrated into their daily routines. For example, there is a culture of "have a chat" present, which has been passed down from the 1st to 2nd generation of family management. This "have a chat" culture is enacted in managements practices of taking time out from their busy day to connect with their customers and employees. This is similar to the culture in Google offices, where employees are encouraged to hang out and the offices are designed to have common areas, where spontaneous conversations can occur. When testing new ideas, Teresa and the management team can approach regular and trusted customers for honest, informal feedback. For example, when they decided to develop a membership scheme for their farm, they opted for a different approach to some

competitors. Rather than memberships allowing for a second free guest pass on visits, Teresa felt that it was important that a membership would only allow free entry for the member. Teresa feared there may be some negative reaction from customers, however thanks to the 'have a chat' culture in Leahy's Open Farm, Teresa was able to gauge initial customer reaction, and after the initial reaction was positive, they were encouraged to continue with the membership approach. This has since proved to be an important revenue stream to the organisation that was particularly important during forced closure during COVID-19 restrictions, resulting in a very low number of memberships being cancelled during this period.

This culture in Leahy's enables the owners observe what is working well, what is not working well and allows for the spark of creativity that emerges from conversations between people with different perspectives.

Nurturing skills, *harnessing the competency base*, and *organisational learning* present three perspectives to understand the innovation capabilities of an organisation like Leahy's Open Farm. Leahy's also demonstrate significant competence in terms of their innovation approaches to strategic intent, use of resources, management of processes, and mindset as per (Carlgren, 2013). An organisation's innovation capability enhances their ability to develop competitive advantage during positive economic conditions and may be vital for survival during challenging conditions.

5. Challenges facing the company

Due to COVID19, the family run business experienced a drop-off in visitor numbers and revenue, like many small companies in Ireland. The business needed to be innovative, while meeting the government guidelines, and following discussion with their employees, they decided to extend the outdoor summer camp programme. Every summer, the open farm runs outdoor summer camps over a three-week period. In order to boost their revenue stream and provide employment, they ran the outdoor summer camps from the 19th of June until mid-August 2020. This proved very popular, where the first summer camp sold out in 20 minutes. This generated approximately €8,000 in revenue for the business, normally the three-week summer camps generate €2,000. Due to COVID19, the business has introduced reduced handling of cash. Customers now buy items, such as, tickets for the digger park at a central kiosk. A positive knock-on effect of this has been increased sales of hot drinks and snacks (ten-fold increase compared to previous years). Following this success, the business intends on adding a seating area and kiosk in the new leprechaun castle, which will be added in 2021.

Like many businesses in Ireland, Insurance is a rising cost for Leahy's Open Farm. The National Competitiveness Council (NCC) in their recent report on Ireland's Competitiveness Challenge highlighted the rising price of public liability insurance leading to an increase in costs of doing business and how it affects our competitiveness (*Ireland's Competitiveness Challenge*, 2020). The NCC supports the work of the 2018 working group 'Cost of Insurance' set up by government. According to the Competition and Consumer Protection Commission public liability insurance accounts for about 12% of premiums overall amounting to €439 million in 2018, which has increased year on year since 2012 (*CCPC, 2020*). Leahy's Farm and small businesses would welcome a reduction in insurance costs and consequently lower business costs. Leahy's Farm insurance premium for 2020 increased by 33% compared to 2019 and they continue to experience small injury claims for injuries sustained by customers on the farm. Leahy's recognising the increased operating costs, implemented a green initiative to reduce long term operating costs and ensure their way of working is more environmentally sustainable. The initiative included; installing Solar Power, replacing oil heating with an air to water system and changing all lightbulbs to LED. In an effort to further reduce costs, they have installed Solar Power, they plan on replacing oil heating with an air to water system and have changed all bulbs onsite to LED, in order to become greener and more sustainable.

Despite the innovative initiatives implemented by Leahy's to combat trading restrictions and increasing operating costs, by October 2020, the business was down 50% on revenue compared to the previous year. Given the business was in a strong financial position pre COVID-19, they have been able to weather the storm. However, this is very much dependent on opening their business as normal by summer 2021 and a strong economic recovery. The ongoing pandemic and the associated financial difficulties are taking its toll on small businesses. One of the toughest decisions they had to make was letting their employees go in March 2020 due to COVID-19. The uncertainty of when they were to open again took its toll on the family run business.

Following the announcement of the second national lockdown on the 21st of October, Leahy's Open Farm was required to close for 6 weeks until early December. The owners were worried about the well-being and financial uncertainty of their employees. The government supports including the Pandemic Unemployment Benefit, Wage Subsidy Scheme and cash payments based on 2019 average weekly turnover alleviate some of the worry for employees and business owners. The economic outlook for 2021 and beyond and how the economy recovers is dependent on the length of the COVID-19 crisis and whether the EU and the UK can agree a free trade agreement before the end of 2020. The economic outlook is uncertain for small businesses and a recovery in domestic demand will be important for them. The Central Bank of Ireland forecasts GDP to grow by 3.8% in 2021 and 4.6% in 2022, following an estimated growth of 2.5% in 2020. Strong export growth in pharmaceuticals, medical devices and the IT sector has supported GDP growth and future growth is contingent on containing the Covid-19 pandemic. Unemployment (percentage of the labour force who are out of work) is estimated to grow to 9.3% of the Labour Force in 2021 and 7.8% in 2022. (CBI, 2021).

6. Conclusion

The shape of the open-farm industry in Ireland continues to shift, and external factors outside of Leahy's control will continue to provide new challenges. However, Leahy's Open Farm continues to demonstrate organisational resilience and continues to innovate and develop new revenue streams. Firm Innovation Capabilities' provides a powerful lens by which to understand the good practices that lead to the development of new business ideas and improvement in existing products and services. Firm innovation capabilities may also provide a useful benchmark by which an organisation can look to reflect and improve on their practices. Leahy's plan to continue to develop their product and service offerings, with plans in place to expand the physical site and further develop their food, education, experience and seasonal businesses. Employees of Leahy's Open Farm are an intrinsic element in the success and implementation of any of the businesses' innovation practices, and this is recognised and encouraged by the farm's owners. They strongly believe that empowering their employees to make suggestions and offer ideas to solve problems, grow the business and add to the customer experience is at the centre of the farm's success. Encouraging and facilitating employees to implement and take ownership of their ideas means that there is a continuous pool of innovation capabilities to tap into. The Open and Pet Farm industry is growing and developing in Ireland, and this industry has little to no support. It is recommended that the Department of Agriculture create a network for open and pet farms in Ireland, similar to NFAN in the UK. This case study can form a template for further studies of open farms and augment knowledge in this industry, which is currently not available. Following this primary research, we suggest a strategy and future roadmap for the open farm industry in Ireland as per figure 1. Roadmap for Open Farms in Ireland, post Covid19 crisis. This roadmap, with government support, is an opportunity for the open-farm industry to establish best practice principles, develop an open-farm rating system and grow a supportive network. These strategies are an opportunity for the many family businesses in the open farm sector in Ireland to re-innovate, grow and thrive following the many negative impacts to their business from the global Covid19 pandemic.

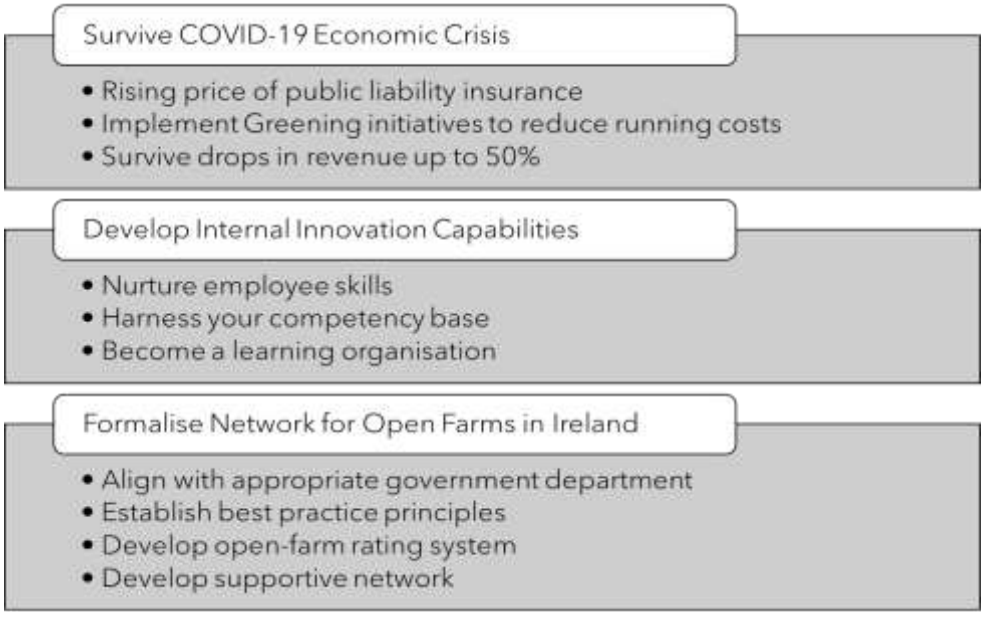

Figure 1: Roadmap for Open Farms in Ireland post COVID-19 economic crisis

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Exploration of Entrepreneurship Orientation Among SMEs in the Sultanate of Oman

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Abstract: Entrepreneurship in Oman is still in the developing stage considering the business policies and structures and currently, the government is focusing on strengthening the SME in the country. Administering the challenges among the SMEs in Oman proving that there is scope for growth of entrepreneurs in the country. Oman 2040 vision has a specific emphasis on small and medium enterprises and is the key to the long-term economic growth of the country. The literature review proved that SMEs in Oman are facing challenges in developing and implementing their strategies. The study attempt to identify ways and means, which will establish and sustain the vibrancy for Omani SME entrepreneurs so that they can play a vital role as the engine of growth in Oman's economic development efforts in the form of independent variables such as capacity building, employment generation, promoting competitive market, technological development. A structured questionnaire was used to collect data from 174 SME entrepreneurs from the Sultanate of Oman and was analyzed with stepwise multiple regression to study the impact of independent variables on growth, stability, and economic development. However, it is revealed that the overall regression model is a good fit for the data. This study shall highlight the opportunities for Omani to encourage and facilitate new business startups. It is therefore recommended that there needs a strong partnership with industries that can mutually benefit and provide support to the new startups in the country. The author concludes by examining the factors affecting the economic development and the steps to be taken by the authorities to evolve a conducive environment to encourage more new SMEs in the country.

Keywords: entrepreneurship, SME, economic development, stability, growth

1. Introduction

One of the central challenges in improving economic development is to increase the standards of living for individuals and growth of the economy as a whole (Stam & Van Stel, 2011). In traditional models of economic growth investment in capital, labour and technology is sufficient to realize economic growth. New models of economic growth see these investments as a necessary complement to entrepreneurship/innovation, but not as a sufficient explanation for economic growth in its own right (Nelson & Pack 1999). Many studies emphasize entrepreneurship as a driver of economic development and some authors include entrepreneurship as a fourth production factor in the macroeconomic production function (Audretsch & Keilbach 2004). In developing countries, the large firms are missing, and in transition countries there are large organizations, but these are largely in a process of restructuring and dismantling. This means that small firms will be the prime movers in the process of structural change in developing and transition economies. The level of growth-oriented entrepreneurship in a country is a more relevant driver of economic growth than the mostly used indicators of entrepreneurship like the self-employment and new firm formation. (Stam & Van Stel, 2011).

2. Rationale of the study

Entrepreneur paves the way to industrialization; industrialization strategies could better target high-potential entrepreneurial activities to accelerate industrialization (Omoruyi et al., 2017). Entrepreneurship has been widely thought as instrumental in driving modern growth (Jiang et al., 2010). Entrepreneurship encourages diversification into new economic sectors and adapts foreign technologies to local markets for its growth. It is bolstering industrialization by efficiently shifting resources away from traditional sectors into more modern one (Omoruyi et al., 2017). One of the fundamental problems of any national and regional economy is to determine the drivers of economic growth and development. Given the severe economic downturn in some countries and the high unemployment rate, especially among young people, their orientation towards entrepreneurship, which is considered an engine for economic growth, is crucial (Stoica et al., 2020). Several researchers argue that entrepreneurship can make a significant contribution to the economic growth by serving as a means for introducing innovations, knowledge spillovers, increasing competition, and increasing the variety of businesses (Audretsch et al., 2006 & Mueller, 2007). Small and Medium sized businesses have traditionally played a significant role in the economic growth of developed and developing nations alike (Magd & McCoy, 2014). Researchers have continuously emphasized the importance of the promotion of SMEs in order to provide

primary and secondary sources of income and alleviate high levels of poverty particularly in developing regions (Tambunan, 2008; Cunningham, 2010). The contributions made by SMEs and entrepreneurial individuals in terms of innovation, provision of employment opportunities and diversifying the economy are significant and evident in past literatures (Magd & McCoy, 2014).

As the Omani economy moves into a more complex phase of industrialization and because more global, in its activities, the integration of an efficient network of supply industries is extremely essential if export activities are to expand (Al-Markhazi, 2001). Oman has for some time now appreciated the positive relationship that business start-ups have with the provision of employment opportunities, alleviation of poverty and diversification of the economy. In Oman, the SMEs sector has attracted considerable attention from the Government reflected in Oman vision 2040. The strategy has laid the development of the SMEs sector in its priorities to diversify the national economy and reduce its heavy reliance on oil that is witnessing greater price volatility in the global market (Alqassabi, 2020). As a result of this a number of initiatives have been introduced to facilitate an environment that is conducive to entrepreneurship (Magd & McCoy, 2014). Small and Medium Enterprises are mostly endogenously based enterprises, their links with large companies in Oman contribute indirectly to the same goal and therefore, by encouraging these links, the growth and expansion of SMEs are fostered (Muthuraman et al., 2020). The Omani government has made it clear that small businesses will play one of the leading roles in Oman's future industrial growth and, to assist such businesses, it has taken responsibility for the establishment of the nation's infrastructure (Muthuraman et al., 2021). Arising the above discussion this research has been conducted to examine the SME variables such as capacity building, employment generation, promoting competitive market, technology towards the economic development in the Sultanate of Oman.

3. Objectives of the study

The contribution of entrepreneurship to economic growth and to the development of an economy is widely discussed and accepted (Audretsch et al., 2006 & Ivanović-Djukić, et al., 2018). The contribution made by Small and Medium Enterprises (SMEs) in developing and achieving national goals is recognized in developed and developing countries alike and, as such, they are seen to be of vital importance in many nations' strategic agendas (Muthuraman et al., 2020). However few studies indicate mixed results regarding the role of entrepreneurship in economic growth due to the variety of types of entrepreneurship (Stoica et al., 2020). In this context, the objective of our research is to examine and identify the ways and means, which will establish and sustain the vibrancy for Omani SME entrepreneurs so that they can play a vital role as the engine of growth in Oman's economic development. The study also accesses the impact of SME variable such as capacity building, employment generation, promoting competitive market, technology towards the economic development in the Sultanate of Oman.

4. Materials and methods

The study adopted quantitative research and it was applied to various small and medium entrepreneurs across the Sultanate of Oman. A structured questionnaire was submitted to the experts and few sample populations for pilot test and the reliability was calculated with the help of Cronbach alpha (Hair et al., 1998). Cronbach Alpha value was calculated, and it was found to be 0.875 and the total numbers of questions were 45. The values were found to be in the range of 0.60 and 0.90, hence it might be suggested that all the scales met the reliability condition (Hair et al., 1998, p.118). Employing nonprobability convenience sampling technique for collecting data from 174 SME entrepreneurs in the Sultanate of Oman. A five-point Likert scale was applied to measure the five independent variables such as capacity building, employment generation, promoting competitive market, technology. Here the intermediate variables are economic stability and economic growth, and the dependent variable is economic development. Descriptive and statistical analysis was performed using SPSS software version 20. The hypotheses stated in the study were analyzed with the help of stepwise multiple regression.

5. Results

Table 1 presents the demographics data based on gender, experience of running the business and sector in which the respondents running their business with their description range and frequency

Table 1: Demographic data

Description		Frequency	Percentage
Gender	Male	113	**65**
	Female	61	**35**
Experience of running the business	Less than one year	19	**11**
	Between 1 and 5 years	85	**49**
	Between 6 and 10 years	49	**28**
	Between 11 and 15 years	12	**7**
	Over 15 years	9	**5**
Sector	Oil & Gas	18	**10**
	Manufacturing	8	**5**
	Retail/Trading	41	**24**
	Construction	15	**9**
	Real Estate	7	**4**
	Telecommunication	12	**7**
	Services	19	**10**
	Health	10	**6**
	Education & Training	15	**9**
	Hotel & Restaurants	7	**4**
	Tourism	2	**1**
	Information Technology	13	**7**
	Finance / Insurance	7	**4**

The analysis (Table 1) reveals that majority of the respondents 65% were male entrepreneurs and the remaining 35% were female entrepreneurs. It is found that slowly the number of female entrepreneurs is increasing in the Sultanate. The experience in running the business, 49% of the entrepreneurs are running the business between one to five years and 28% of the entrepreneurs are running the business for more than five years. Omani entrepreneurs are doing business in various sectors which is listed in the above table, in which around 24 % of them are doing their business in retail sector followed by Oil & Gas and Service sector.

6. Impact of SME variables on economic development

To study the impact of SME variables like Capacity building & Innovation, Employment generation, Promoting Competitive market, and Technology on Economic development (Y), researcher conduct stepwise multiple regression analysis. Variables were entered into the model beginning with (1) Promoting Competitive market; (2) Employment generation. The Table 2 shows the unstandardized regression co-efficient (B), unstandardized standard error of regression coefficients (SE B), standardized regression coefficient (β), R^2, and F for changes in R^2.

Table 2: Step wise multiple regression for promoting competitive market & employment generation on economic development

Variables	Model 1			Model 2		
	B	**SE B**	**β**	**B**	**SE B**	**β**
Constant	4.680	1.982		-0.079	1.960	
PCM	0.942	0.060	0.766	0.648	0.073	0.527
EG				0.473	0.77	0.362
R^2	**0.587**			**0.661**		
AdjustedR^2	**0.584**			**0.657**		
F	244.049			166.708		
df	(1, 172)			(2, 171)		
Sig (P)	0.001			0.001		

It is inferred from the Table 2 that Promoting Competitive market is entered at Step 1 and predicts 58.4% of Economic development (R^2 = 0.587, F (1,172) = 244.049, p=0.001). When Employment generation is entered at Step 2, there is 7.3 % increase in predictive capacity (R^2 = 0.661, F (2,171) = 166.708, p=0.001).

Model Equation:

Y = -0.079 +0.648(Promoting Competitive market) + 0.473 (Employment generation)

From the above equation it is evident that the independent variables promoting competitive market and employment generation are significant predictors for the economic development.

7. Impact of SME variables on economic growth

To study the impact of SME variables like Capacity building & Innovation, Employment generation, Promoting Competitive market, and Technology on Growth (Y), researcher conduct stepwise multiple regression analysis. Variables were entered into the model beginning with (1) Employment generation (2) Promoting Competitive market; (3) Technology. The Table 3 shows the unstandardized regression co-efficient (B), unstandardized standard error of regression coefficients (SE B), standardized regression coefficient (β), R^2, and F for changes in R^2.

Table 3: Step wise multiple regression for employment generation, promoting competitive market, and technology on economic growth

Variables	Model 1			Model 2			Model 3		
	B	**SE B**	**β**	**B**	**SE B**	**β**	**B**	**SE B**	**β**
Constant	9.450	1.536		6.864	1.621		5.548	1.657	
EG	0.489	0.50	0.598	0.326	0.064	0.399	0.225	0.072	0.275
PCM				0.233	0.060	0.303	0.226	0.059	0.293
TECH							0.166	0.059	0.208
R^2	**0.358**			**0.410**			**0.436**		
AdjustedR^2	**0.354**			**0.403**			**0.426**		
F	95.868			59.356			43.782		
df	(1, 172)			(2, 171)			(3, 170)		
Sig (P)	0.001			0.001			0.001		

It is inferred from the Table 3 that Employment generation is entered at Step 1 and predicts 35.4% of Growth (R^2 = 0.358, F (1,172) = 95.868, p=0.001). When promoting competitive market is entered at Step 2, there is 4.9 % increase in predictive capacity (R^2 = 0.410, F (2,171) = 59.356, p=0.001). Finally, Technology is entered at Step 5 there is further improvement in the model with 2.3 % increase in predictability (R^2 = 0.436, F (3,170) = 43.782, p=0.001).

Model Equation:

Y = 5.548 +0.225(Employment generation) + 0.226 (Promoting Competitive market) + 0.166(Technology)

From the above equation it is concluded that the independent variables employment generation promoting competitive market and technology are significant predictors for the economic growth.

8. Impact of SME variables on economic stability

To study the impact of SME variables like Capacity building & Innovation, Employment generation, Promoting Competitive market, and Technology on Stability (Y), researcher conduct stepwise multiple regression analysis. Only one Variable was entered into the model with Technology. The Table 4 shows the unstandardized regression co-efficient (B), unstandardized standard error of regression coefficients (SE B), standardized regression coefficient (β), R^2, and F for changes in R^2.

Table 4: Step wise multiple regression for capacity building & innovation, employment generation, promoting competitive market, and technology on economic stability

Variables	Model 1		
	B	**SE B**	**β**
Constant	7.586	0.450	
TECH	0.077	0.016	0.350
R^2	**0.122**		
AdjustedR^2	**0.117**		
F	24.003		
df	(1, 172)		
Sig (P)	0.001		

It is inferred from the Table 4 that Technology is entered at Step 1 and predicts 11.7% of Stability (R^2 = 0.122, F (1,172) = 24.003, p=0.001).

Model Equation:

Y = 7.586 + 0.0.077(Technology)

From the above equation is it evident that the independent variables such as Capacity building & Innovation, Employment generation, Promoting Competitive market, and Technology is significant predictor for economic stability.

9. Impact of growth and stability on economic development

To study the impact of SMEs Growth and Stability factors on Economic development (Y), researcher conduct stepwise multiple regression analysis. Variables were entered into the model beginning with (1) Growth and (2) Stability. The Table 5 shows the unstandardized regression co-efficient (B), unstandardized standard error of regression coefficients (SE B), standardized regression coefficient (β), R^2, and F for changes in R^2.

Table 5: Step wise multiple regression on growth and stability on economic development

Variables	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Constant	13.426	2.505		5.051	3.967	
Growth	0.888	0.101	0.556	0.837	0.101	0.524
Stability				0.988	0.367	0.171
R^2	**0.310**			**0.338**		
AdjustedR^2	**0.306**			**0.330**		
F	74.143			43.594		
df	(1, 172)			(2, 171)		
Sig (P)	0.001			0.001		

It is inferred from the Table 5 that Growth is entered at Step 1 and predicts 30.6% of Economic development (R^2 = 0.310, F (1,172) = 74.143, p=0.001). When Stability is entered at Step 2, there is 2.4 % increase in predictive capacity (R^2 = 0.338, F (2,171) = 43.594, p=0.001).

Model Equation:

Y = 5.051 +0.837(Growth) + 0.988(Stability)

The above equation shows that the independent variables Growth and Stability are significant predictors towards Economic Development.

10. Discussion

The most striking finding of this study is that the SME variables like Capacity building & Innovation, Employment generation, Promoting Competitive market, and Technology support the Economic development. Even from the past literature the contribution of entrepreneurship to economic growth and to the development of an economy is widely discussed and accepted (Ivanović-Djukić, et al., 2018 & Stoica et al., 2020). Oman's economy, like the rest of the Gulf, has generally depended on oil. Like other countries in the Gulf, Oman has focused on diversifying its economy, strengthening the private sector. One way for Omanis to become self-empowered is to start their own businesses (Richie, 2018). Eniola and Entebang (2015) explained that SMEs in Oman are primarily considered as one of the most important parts of the country and helps to manage the level of the economy. The SME role is not crucial as expected to play in Oman's economic development (Muthuraman et al., 2021). Entrepreneurship in Oman is still in the developing stage considering the business policies and structures and currently, the government is focusing on strengthening the SME in the country.

Administering the challenges among the SMEs in Oman proving that there is scope for growth of entrepreneurs in the country. A stable entrepreneurial ecosystem in Oman is possible through a much improved and diversified economy, although some weaknesses can be identified in employment opportunities, Omani nationals need frequent notification and training on how to make use of existing entrepreneurial opportunities in diversified

sector such as manufacturing, tourism, mining, agriculture, and logistics as per Oman 2040 vision (Eddin & Thomas, 2018).

Government has also introduced various programs through which enough training could be provided. Government has imposed various public policies like legal registration under a reliable legal authority which in turn enabling the SMEs to sustain in the long run of the business (Alqassabi, 2020). There is the need for entrepreneurial development through new jobs creation and provide income for the people (Omoruyi et al., 2017).

Governments need to support entrepreneurship and innovation as a way of removing people from poverty because innovative entrepreneurship act about changes in the structure of the economy, technological upgrading in production, and moving higher value performing global value chains (Szirmai et al., 2011). If the governments can adapt to technological change that embraces the new modern use of machinery and equipment and modern generation of tech-literate educated workers, the region can experience a shift in their economies and will not need handouts from developed countries (Omoruyi et al., 2017). The strategic significance of entrepreneurial in national economic development is widely recognized (Hussain et al., 2014 & Kareem, 2015). However, for Omanis to start their own businesses, what is required is not just the willpower and idea, but also an ecosystem to grow their dreams (Richie, 2018).

Oman government is introducing Fund like Alraffd Program, Livelihood Fund and Rural Women's Program to help different types of SMEs to develop. This type of financial funds will attract the young people towards the SMEs (Alqassabi, 2020). Government aimed to support, encourage, and promote the entrepreneurial growth and advancement among the citizens of the Sultanate of Oman. It is wonderful to see a rise, increase, and interest amongst the local Omani population and across the wider GCC with respect to entrepreneurship and innovation (Richie, 2018). Oman needs a much wider entrepreneurship policy approach, including coordination of several bodies including both the private and the public sector (Eddin & Thomas, 2018). There is a need for inculcating entrepreneurship education and developing entrepreneurial skills among students has become an essential component in college and university curriculum (Subrahmanian, et al., 2017). According to the GEM 2019 results, the policy areas in Oman needing the most examination include education and training programs that promote a culture of entrepreneurship; support programs funded by the government and private sector; the country's many incubators and mentorship programs; and the physical infrastructure that provides support (Bosma et al., 2020).

Our study is important for policy makers because it highlight that the SME variables such as capacity building, employment generation, promoting competitive market, technology towards the economic development in the Sultanate of Oman. Moreover, the Omani entrepreneurs need to be encouraged to start their own venture which will bring out the hidden talent of Omani nationals and will multiply the opportunity generation for many youngsters and have a positive effect on the economy. Considering the significant role played by the Omani entrepreneurs for the economic development and the result of our research, we consider it that the decision makers focus more on developing opportunities and eliminate obstacles that Omani entrepreneurs face and support their initiatives to achieve economic development of the country. It is also recommended that there needs a strong partnership with industries that can mutually benefit and provide support to the new startups in the country. The author concludes by examining the SME factors like Capacity building & Innovation, Employment generation, Promoting Competitive market, and Technology affecting the economic development and the steps to be taken by the authorities to evolve a conducive environment to encourage more new SMEs in the country.

11. Conclusion

Sustained economic growth has positive long-term effects on businesses. Oman 2040 vision has a specific emphasis on small and medium enterprises and is the key to the long-term economic growth of the country. Thus, a high quality of the entrepreneurial activities, at present, generates positive effects on the economic growth, and subsequently determines an improvement on the business environment (Stoica et al., 2020). Oman Government initiatives include the introduction of new financing methods to support technology startups through the Oman Technology Fund, and the establishment of government blogs and platforms to communicate with entrepreneurs which will motive more Omanis to think of starting a new venture (Bosma et al., 2020). The main limitation of our research comes from relatively small sample size (174) and focus only on the Muscat city.

In our future study we wish to expand both the sample size and the consider the other governates in the country. The study suggests that there is a need for comprehensive strategy to create opportunities for the young Omani to start their own business venture and the Government should create more business incubation centers to facilitate required facilities and assistance for the young Omani to obtain necessary permits and requirement to start their own venture which will play a vital role in the growth of national economy.

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R&D Spending, Innovations and Productivity Growth of the Russian Firms

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Abstract: The aim of this study is to assess the impact of R&D spending on innovation and productivity growth of Russian high-tech firms. Our research is based on BEEPS data for 2012-2014 for Russian firms, extended by the regional integral index of innovative development. We employ a modified CDM model, which consists of three stages linking R&D spending, innovation, and productivity growth. At each stage, we consider both internal and external factors important for R&D, innovation, and productivity. Our research expands the existing literature, first, by analyzing the R&D spending-productivity link in Russian high-tech firms based on BEEPS data. Second, at the last stage of the model, we study the firm-level productivity change over three years, which allows us to consider the dynamics of the key indicator of firms' performance and to capture the impact of innovation on this dynamics, in contrast to the original model with static productivity level. The results show the positive impact of import and share of the firm owned by private foreign individuals on R&D spending of high-tech firms. R&D expenditures are found to have a significant positive effect on innovative sales. Additionally, the indicator of favorable regional innovative conditions and cooperation have a significant positive effect on firms' innovation activity. Employee training was found to be especially important for innovative sales of high-tech firms. Besides, our model confirms that barriers to business operation affect R&D investment. Finally, the effect of innovative sales on productivity growth is not significant for high-tech firms. This may indicate weak competitiveness and high cost of innovation faced by the Russian high-tech firms. The results provide a background for policy recommendations. In particular, we suggest that attention should be paid to development of a business environment favorable for innovations, cooperation and international economic activity.

Keywords: R&D, innovations, productivity growth, CDM model, business climate, high-tech firms

1. Introduction

The effects of R&D on innovations and further on enterprise productivity are widely discussed for various countries. Indeed, innovations are important for the firms' productivity and for the long-term economic growth. At the same time, firms' innovations depend on external and internal factors, industry and regional characteristics. In addition, research on the impact of R&D and innovation on firms' productivity dynamics in the framework of the CDM-model has received little attention in the literature, especially for transition economies. Thus, all these aspects require further study.

Our aim is to investigate the link between the decision to invest in R&D, actual innovations and their effects on productivity growth. Special attention is paid to the role of international economic activity in firms' innovation process. Since connections between these indicators are often considered endogenous, we use a three-stage Crepon-Duguet-Mairesse (CDM) model (Crepon, Duguet, Mairesse, 1998). The model allows addressing econometric and data-related issues, namely, to correct for selectivity and simultaneity biases.

We employ firm-level data on the Russian firms based on the BEEPS survey. We consider specifically high-tech firms. They are the main engine of the country's innovative growth, and therefore it is important to understand what factors promote or hinder their innovation activity. Besides, we use a regional integral index of innovation development to account for the external innovative environment. The regional innovation development index consists of 37 indicators that can be summed up into four blocks: social and economic conditions of innovation activity, research and development potential, innovation activity, and quality of innovation policy (Gokhberg, 2014).

Our research expands the existing literature on innovations and productivity by studying the impact of R&D and innovations on firm-level productivity change over three years. It allows us to consider the dynamics of the key indicator of firms' performance and to capture the impact of innovation on the productivity growth, in contrast

to the original CDM-model with static productivity level. Besides, we estimate the R&D spending-productivity link of high-tech firms in the transition economy of Russia based on BEEPS data.

In addition, we use a range of firms' characteristics and a number of exogenous factors, such as a firm's involvement in import, share of the firm owned by private foreign individuals, competition, regional index of innovative development, as well as indicators of business climate. In this way, we cover internal and external factors that affect innovation activities. Besides, we take into account various sources of cooperation ties that are important for the implementation of innovations.

Our research is based on the following hypotheses. The first hypothesis is that R&D affects innovations and productivity dynamics of high-tech firms. The second hypothesis is that both firm's efforts in innovation activities and the regional innovative environment are important for R&D and innovations. In particular, the firm can organize training of personnel and establish cooperation links with other organizations for innovation. At the same time, the regional innovative environment, including business climate and external human capital, also affects firm's innovation activities. In this regard, we include internal and external human capital in the model: personnel training carried out by the company and employees' qualification in a region. Business climate indicators are tax rates and business permits. We employ innovative sales reported by firms as an innovation outcome, this indicator being widely used in the literature.

The results show that R&D expenditures have a significant positive effect on innovative sales for high-tech companies. Additionally, various sources of cooperation have a significant positive effect on firms' innovation activity. Finally, the significant effect of innovative sales on productivity growth is not observed for high-tech firms. This may indicate weak competitiveness and high cost of innovation faced by the Russian high-tech firms and reflect the problems in Russian high-tech business.

The rest of the paper is organized as follows. In the next section, we provide a brief review of research papers focused on our topic. The next section is devoted to the data and methodology. Then we present and discuss the results of the econometric analysis. The last section concludes and discusses possible policy implications.

2. Background and the existing research

The relationships between R&D, innovation and productivity have been estimated across countries, especially for developed countries. However, the analysis of this issue for transition countries is of particular interest, because they are relatively more vulnerable to various fluctuations in the economy, and need to develop more stable innovative sectors. Ramadani et al (2019) found that product innovation has a positive impact on firm performance in European and non-European transition economies. At the same time, the authors note that entrepreneurs are more rent-seeking than innovation-driven in transition countries.

Different methods are applied to assess the impact of R&D on innovation and productivity in the same model, while the fundamental model linking the intensity of R&D, innovations and productivity in a single chain is the CDM-model (Crepon-Duguet-Mairesse model, 1998). The CDM-model was developed by French researchers Crepon, Duguet and Mairesse (1998) to assess the innovative activity of firms. The model contains three main stages. In the first stage of the model, R&D factors are investigated, then the impact of predicted R&D expenditures on innovations is estimated in the second stage, and the last stage takes into account the impact of innovations on enterprise productivity. Thus, the model covers the main stages of the innovation process - from the decision to invest in R&D to implementing innovations and then to productivity of firms. The model allows taking into account firm and industry characteristics. Crepon et al (1998) reveal a positive effect of R&D activities and innovations on value added per employee of the French firms. This model is widely used and modified by researchers, including Griffith et al. (2006), Hall (2011), Janz, Lööf and Peters (2003), Masso and Vahter (2008), Cirera (2015), Ayyagari, Demirgüç-Kunt and Maksimovic (2012) and others. Most of them revealed positive relationships between R&D spending, innovations and productivity at least in the long run. Nonetheless, none of these studies considers Russian economy. In our research, we are aiming to fill this gap in the literature.

As an output measure at the third stage, the logarithm of sales or value added per employee is most often used in the literature, however, the indicator of change or growth in productivity is less common. Leeuwen and Klomp (2006) revealed the positive returns from innovative sales for the annualized growth rates of total sales during

1994--1996 based on CDM-model and data on the Dutch firms. Adamou and Sasidharan (2007) found an increasing rate of sales growth with an increase in current R&D of the Indian manufacturing firms. Kemp et al (2003) showed that the innovative output has a higher effect on the turnover growth for small firms than for medium-sized firms in Europe. We also use indicator of the productivity growth. This approach will allow us to estimate the innovation impact on sales more accurately, not taking into account 2014 market conditions in Russia that severely affected sales of many companies.

As for the factors influencing the R&D and innovations, Marotta et al (2007) found that collaboration of firms with university and research institutions, as well as a higher level of employees' education are associated with an increase in the probability of introducing a new product in Chilean and Colombian firms. In addition, Frenz and Ietto-Gillies (2009) found that the international dimension of internal connections (networks) is very important, and the interaction between internal knowledge and external sources increases the innovative potential of British enterprises. Galli´e and Legros (2012) revealed the positive effect of in-service employee training in its various forms on the patenting activity of French industrial firms, and Cirera (2015) showed that international competition, market pressures on product diversification, and access to finance have the strongest effect on the R&D intensity of Kenyan firms. Bozic and Botric (2011) found that receiving subsidies, pressure from consumers and foreign competitors, political instability, tax rates, and inadequate education of workers positively influence the propensity to innovate.

There have also been attempts in the literature to investigate innovation activity by industry groups. Morris (2018) estimated the impact of innovations on productivity of manufacturing and service firms based on cross-country data and applying the CDM model. Results showed that product and process innovations improve firms' productivity, and some factors of R&D intensity produce different effects for the manufacturing and services sector. Bartoloni and Baussola (2018) revealed that complementarity between technological and non-technological innovations especially increases the productivity premium for the firms of medium- and high-tech sectors. Baum et al (2017) found heterogeneity in the effects of key factors of R&D-innovation-productivity relationship across sectors with different levels of technological development using the data on Swedish firms. Ortega-Argiles, Potters and Vivarelli (2011) revealed the increasing effect of R&D expenditures on the productivity of European firms from the low-tech to the medium-high and high-tech sectors, and Polder et al (2010) found the positive effect of R&D on product innovations in manufacturing sector. We focus on the high-tech sector exclusively, since such companies are usually more innovative.

The case of Russian firms within the framework of the CDM-model has been studied by Roud (2007). The author found a positive relationship between innovation and productivity in the knowledge-intensive manufacturing sector of Russia based on data for 2005 year from Rosstat. According to the analysis, the innovation activity of firms is characterized by a lack of financial resources and human capital, as well as an orientation toward acquiring and imitating technologies rather than developing them. Other works dedicated to Russian firms suggest that human capital is important for innovations, while a number of external factors such as s political stability, tax policy, and investment risks fail to produce a significant effect on innovation of Russian firms (Davidson, Mariev, Pushkarev, 2018). Compared to previous studies, we take a closer look at the human capital aspect of the innovations. Namely, on the different stages of the model we consider indicators of the human capital supply (inadequacy of the workforce response) and proactive human capital improvement by a company (cooperation with universities, personnel training).

Russian citizens belong to around 140 nationalities characterized by their own culture (Bogoyavlensky, 2008). As business climate tends to be associated with culture, it is likely to differ among various social groups in the Russian regions (Davidson, Mariev, Rakhmetova, 2021). Values are 'broad motivational constructs that express what people consider important' (Schwartz, 2017a). In their turn, basic values can be defined as trans-situational goals and serve as guiding principles in the life of individuals and groups. They imply choices between focus on personal or social issue, openness to change vs. conservative behavior, prevailing self-interests or service of others, growth, self-development or self-protection (Schwartz, 2017b).

These definitions imply that values affect business practices, and overall, business climate in the countries and regions. In its turn, business climate affects firm innovation and performance (World Bank, 2020). While innovations contribute to economic diversification, innovative firms are particularly affected by business climate (Srholec, 2011). Namely, it was found that in Russia, barriers to firms' activities, such as crime, difficulties associated with transport and inadequate employee education, prevent trained employees from realizing their

full potential in development of innovation (Pushkarev et al., 2020). In our paper we address factors external to the firm and the components of business climate, such as taxes, subsidies, (in)adequacy of the workers' specialization, ease of receiving business licensing and permits, and index of innovation development.

Thus, based on the existing literature and keeping in mind the factors considered above, we chose the CDM model to cover the innovation process on the whole and the mechanisms behind innovative activities. We are filling a gap in the existing literature by considering productivity change as the dependent variable at the third stage of the CDM-model as well as taking closer look at Russian high-tech firms. In general, little attention has been paid in the literature to assessing the CDM model for the Russian firms. Russia belongs to transitional economies, and therefore, it is important to identify the key factors that will allow the country to attain a higher level of innovations and productivity. In our study, we are estimating factors behind R&D, innovations and productivity change by Russian firms.

The next section describes the data and methods of this research.

3. Data and methods

We employ data from the Business Environment and Enterprise Performance Survey (BEEPS) on Russian firms for 2012-2014. The final sample involves 642 high-tech firms from all federal districts. The belonging of firms to high-tech industries is based on the OECD methodology (Hatzichronoglou, 1997), which relies on differences in the intensity of firms' R&D expenditures. This methodology is generally recognized and is used not only for developed countries, but also for transitional economies, including Russia. Thus, the sample includes firms from industries such as Chemicals, Cars and equipment, Office equipment, Electronics, Communication equipment, Precision tools and others.

All qualitative indicators from BEEPS are transformed into dummy variables based on Bozic and Botric (2011). In particular, if a firm has reported that a certain barrier to activities is the main or a very severe issue, the corresponding variable is marked as 1, and it is marked as 0 otherwise. This approach allows us to incorporate these variables into the model.

Based on the existing research (Hall, 2011; Cirera, 2015; Bozic and Botric, 2011, Marotta et al, 2007, etc.), the variables for each stage were chosen to reflect the factors behind R&D activities, those affecting actual innovations, and those essential for productivity growth. At each stage we included the integral index of innovation development of the Russian regions (Gokhberg, 2014) and industrial dummies reflecting specific features of various industries.

The mechanism of the CDM model is mimicking the innovation process and consists of the following stages. At the first stage, firms decide whether and how much to invest in R&D. We evaluate the first stage within the model using a Poisson regression. Apart from the regional integral index of innovation development, the following factors behind R&D activities were identified: 1) external factors – competition, subsidies, business environment conditions – obstacles related to business licensing and permits, tax rates, inadequacy of the workers' specialization; 2) individual characteristics of firms – age, size as a dummy variable (1 is a large firm and 0 otherwise), belonging to a larger association or enterprise as a dummy variable, import (direct import of material inputs or supplies purchased) and share of foreign ownership.

At the second stage, the predicted amount of R&D expenditures within the firm was used in a model with an actual innovative result, innovative sales, as a dependent variable. In this regard, we apply the OLS method. Essentially, this stage of the model represents correspondence between innovative inputs and outputs and allows to estimate the return on R&D for innovations. At this stage, the impact of a firm's human capital is of a particular interest; it is reflected in the variable *training of personnel*. We also argue that a way of implementation of innovations may be important, including licensing of a technology, cooperation with domestic suppliers, foreign suppliers, domestic consumers, foreign consumers, and with universities. To take this issue into account, dummy variables of firms' cooperation with various stakeholders were introduced. They are all compared to the case when the companies did not cooperate with anyone and performed innovations based solely on their own ideas.

At stage three, the impact of innovative sales per employee, predicted at the second stage, on the productivity growth was estimated. In this stage we apply the modified Cobb-Douglas production function, including capital and labor costs per employee, as well as the regional integral index of innovation development. Thus, for the third stage of modelling a modified Cobb-Douglas production function was used:

$$Log\ \Delta y_i = \delta_0 + (1-\alpha-\beta)*Log\ h_i + \alpha*Log\ k_i + \beta*Log\ l_i + \varepsilon_i, \quad (1)$$

where Δy, h, k, l are productivity growth, innovative sales, capital and labor costs per employee of the i-th company. It is worth noting that innovative sales, as well as capital and labor costs, were divided by the number of employees to account for the size of the enterprise. At this stage, productivity growth is of particular interest. It reflects the firm-level productivity change, that is the difference between current productivity and productivity three years ago. We believe that innovation could have affected firms' productivity dynamics, and we expect the great impact from innovation in the high-tech firms. An integral index of regional innovation development reflecting the innovative and socio-economic conditions of the region, and the industrial dummies were included in all three equations as control variables.

Table 1 below is devoted to the descriptive statistics of innovative sales (in absolute and relative terms) and productivity change by size of high-tech firms. In the case of innovative sales (in millions of rubles), the statistics show that large companies lead in terms of average and maximum values of innovative sales.

Table 1: Descriptive statistics of innovative sales by size of high-tech firms

	Innovative sales (mln rub)		Innovative sales in revenue, %		Productivity change (thousands of rubles per employee)	
Size of firms	Mean	Maximum	Mean	Maximum	Mean	Maximum
Large	155	4500	26.46	100	-13,9	183000
Small and medium	7.1	1500	34.33	100	-818,8	11700

Source: Authors' calculations based on BEEPS 2012-2014.

Herewith, in terms of innovative sales measured as a share of revenue, we can see that the largest share of innovations belongs to small and medium-sized firms. In other words, small firms are more inclined to introduce innovations. The situation is different because large companies get more benefits from sales due to their resource and market opportunities. Therefore, their innovative sales are large. However, their share of innovative sales in revenue may be small.

Statistics on productivity growth shows that on average, productivity changes were negative for both large and small firms and the greatest negative dynamics is observed in small and medium-sized firms. At the same time, the maximum positive dynamics of productivity is observed in large firms. Such dynamics could be influenced by the efficiency of traditional inputs of productivity - labor and capital costs, as well as by the innovation factor.

The results of estimating CDM-model are presented in the next section.

4. Results and discussion

Below are the results of the first stage of the CDM-model with firms' R&D expenditures as a dependent variable (see Table 2).

Table 2: CDM model for the Russian firms: First stage

The sum of R&D expenditures	High-tech firms
Size	2.444***
	(0.406)
Age	-0.008
	(0.008)
Competition	-0.010*
	(0.006)
Part of the larger enterprise	0.807*
	(0.419)

The sum of R&D expenditures	High-tech firms
Subsidies	0.075
	(0.559)
Taxes	0.162
	(0.445)
Inadequacy of the workers' specialization	0.855**
	(0.379)
Import	1.342***
	(0.410)
Business licensing and permits	0.716*
	(0.378)
Share of the firm owned by private foreign individuals	0.015*
	(0.009)
Index of innovation development	5.422*
	(3.009)
Industrial dummies	Yes
Wald test	4522.28***
Pseudo R2	0.64

Source: Authors' calculations based on BEEPS 2012-2014. Notes: *** significant at the 1% level, ** - at the 5% level, * - at the 10% level. The standard errors in parentheses.

In general, there is a significance of almost all indicators in the model. As we can see from the table, large high-tech firms are more likely to invest in R&D. This result was rather expected, since for the high-tech firms the development and implementation of new products determines the success of business. Because of their capabilities and expanded markets, large firms tend to spend more on R&D than small firms.

Age turned out to be negatively insignificant for high-tech firms at this stage. Number of competitors turned out to be negatively significant for R&D expenditures. This result paint a good picture of the innovative situation in Russia, since Russian high-tech firms are rather weak competitors in resource-oriented economy. In addition, it could be related to low demand for innovations on the Russian market.

High-tech firms belonging to a larger enterprise spend more on R&D. This result can be explained by the fact that if a firm belongs to a larger enterprise it can have access to knowledge, financial and other resources, which are needed for higher innovative capacity. Receiving a subsidy turned out to be insignificant for investing in R&D. On one hand, subsidies received from any sources could be directed to other purposes, such as building good relations with the authorities. On the other hand, enterprises might have little knowledge of the state support programs and how to use them.

A positive coefficient indicates that innovative firms inevitably face some obstacles and experience an increased burden because of them. In particular, high-tech firms face the problem of inadequacy of the workers' specialization and the problem related to business licensing and permits. Import and foreign ownership as indicators of involvement in international activities are positively significant for R&D of high-tech firms. Finally, regional innovative development has the greatest positive effect on the propensity to innovate. As a rule, a more favorable innovation environment is observed in developed regions of Russia, where high-tech business is more prosperous.

In Table 3 below, we present the results of the second stage of the CDM model.

Table 3: CDM model for the Russian firms: Second stage

The logarithm of innovative sales	High-tech firms
Predicted sum of R&D expenditures	2.37e-07***
	(7.86e-08)
Licensing	9.097***
	(2.279)
Domestic suppliers	6.490***
	(1.614)
Foreign suppliers	5.748***
	(2.145)

The logarithm of innovative sales	High-tech firms
Domestic consumers	8.432***
	(1.479)
Foreign consumers	8.102*
	(4.291)
Cooperation with universities	4.669**
	(2.229)
Training of personnel	1.881***
	(0.575)
Index of innovation development	16.202***
	(3.794)
Industrial dummies	Yes
F-test	11.74***
R2	0.20

Source: Authors' calculations based on BEEPS 2012-2014. Notes: *** significant at the 1% level, ** - at the 5% level, * - at the 10% level. The standard errors in parentheses.

The results of the second stage show a positive return on investment in R&D for innovative sales of high-tech firms. This result is quite consistent with the reality, because high-tech industries unlike other industries are by definition the most innovative ones. Moreover, low and medium-tech firms are rather involved in minor modifications or incremental changes to products and processes.

Results on various sources of knowledge and ways of implementing innovations show that all sources of cooperation in comparison with the firm's own idea are positive and significant for innovative sales in high-tech firms. It highlights the importance of collaboration with various stakeholders in innovation activities.

Staff training proved to be positive and significant for innovative results. This indicates the relevance of special skills and knowledge of personnel for innovations.

Below are the results for the last stage of the CDM model (see Table 4).

Table 4: CDM model for the Russian firms: Third stage

Dependent variable – the logarithm of productivity growth	High-tech firms
Predicted Innovative sales per employee	0.079 (0.052)
Cost of capital per employee	0.159 (0.137)
Labor costs per employee	0.138 (0.208)
Integral index of innovation development of Russian regions	1.863 (2.206)
Industrial dummies	No
R^2	0.12

Source: Authors' calculations based on BEEPS 2012-2014. Notes: *** significant at the 1% level, ** - at the 5% level, * - at the 10% level. The standard errors in parentheses.

The results show that innovative sales per employee turned out insignificant for productivity change in high-tech firms. On the one hand, this result seems unexpected and counter-intuitive, as high-tech firms are the most involved in innovation activities. On the other hand, it indicates the low competitiveness of Russian high-tech firms, as mentioned earlier, and high costs of innovation. In addition, the result obtained may indicate insufficient stimulation of innovative activity. The total level of innovative activity of organizations for 2018 in Russia amounted to 14.6% - this is one of the lowest indicators in Europe (Gokhberg, 2020). Besides, traditional factors, labor and capital costs per employee, did not make a significant contribution to the productivity dynamics of high-tech firms. In this regard, special support for high-tech business from the regional and federal authorities seems to be necessary, in addition to improvement of business climate.

Thus, the results of CDM-model on high-tech firms showed a positive return on investment in R&D for innovation, while the return on innovative sales was insignificant for productivity change. The model also revealed a positive impact of import and share of the firm owned by private foreign individuals on R&D spending. It is also worth noting that the regional innovation development index has a greater positive effect at the second stage, that is a favorable innovation environment for high-tech firms is especially relevant at the stage of implementing innovations.

5. Conclusion

The aim of this research was to analyze the effects of R&D spending on innovations and productivity growth of Russian high-tech firms. For this BEEPS data 2012-2014 on Russian manufacturing enterprises from high-tech industries were employed. The development of high-tech business is an important element in increasing the competitiveness of Russia and diversifying the economy. From this point of view, it is important to study the factors that stimulate and inhibit the innovative activity of high-tech firms.

The three-stage CDM model was applied to examine the factors influencing R&D, innovation and productivity. The literature on the CDM model has paid little attention to the study of the impact of innovation on productivity dynamics, especially in developing countries, such as Russia. We aim to fill this gap.

In general, our main results are in line with the existing literature. The results of the CDM model show that there is a positively significant return on R&D for innovative sales in high-tech firms. A number of individual characteristics of high-tech firms, such as size and belonging to a larger enterprise have a significant effect on R&D. In particular, indicators of international economic activities, such as import and share of the firm owned by private foreign individuals, are also found to have a positive impact on firms' R&D. Business licensing and permits as a barrier to operations have a positive effect on R&D expenditures. Besides, the analysis did not reveal a significant effect of subsidies on R&D of high-tech firms. This may be due to the use of subsidies for other purposes and their inaccessibility for small and medium-sized firms. All sources of firm's cooperation, from licensing to universities, are found to be positive and significant for the innovative results. We also look at the effect of external and internal human capital. In the first case, employees' qualification is important for R&D in the beginning of the innovation process. In the second case, staff training is especially important for the innovative result. Regional index of innovation development has the greatest impact at the stage of implementing innovations. Finally, the results of the last stage did not reveal a significant effect of innovation on productivity dynamics for high-tech firms. This result may indicate the insufficient competitiveness of high-tech Russian firms in the international market and the high cost of innovations. It is worth noting that our estimates are lower than previously described in literature. In other words, we observe weaker effects on the dependent variables on all three stages of the model. We theorize that this may be due to less accommodating business environment in Russia, weak local institutions and ineffectiveness of competitive selection.

This study expands current theoretical and empirical analysis of innovation – productivity link. We obtain novel estimates of the effectiveness of innovative spending in Russia. Our findings reinforce the idea of importance of human capital, firm size and ownership form on innovations. On the other hand, contrary to findings based on European data, we fail to find significant effects of subsidies, which highlights how different Russian case is. Thus, we suggest that in further comparison studies, more attention should be paid to regional specifics of countries.

To summarize, estimates shows a low level of innovation activity in Russia in comparison with other countries, as well as the passivity of large firms despite their resource potential. At the same time, small and medium-sized firms lack financial assistance to implement innovations. To build up high-tech industries, government support at all levels and stimulation of innovation are necessary, in addition to improvement of business climate. Special attention should be paid to the development of a favorable and competitive business environment for innovations, including simplification of bureaucratic procedures, and cooperation of firms in the regions. As for development of highly qualified personnel in the region, the state, universities and large firms could make a significant contribution to training and retraining. Organization of personnel training would allow firms to increase not only innovation potential, but also productivity. Besides, it is important to develop a business climate favorable for participation of firms in international economic activities. Our study has some limitations related to cross-section data. In the future, it would be useful to consider R&D-innovations-productivity growth linkages based on panel data to capture more dynamics in the indicators.

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Inter Relationship Between the Attributes of Talent Management Process in Information Technology Sector

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Abstract: Objective: The current research is an attempt to analyze the inter relationship between different attributes of talent management. Methodology: Questionnaires were used to collect data from IT sector employees about their perceptions related to talent management attributes like talent acquisition, development, talent engagement and retention. Descriptive analysis is used to analyze the relationship between the variables. Findings: Based on the findings of the study, it is found that information technology Companies have to need to focus more in strategizing their talent management process for enhanced business outcomes. There is relationship that is strong between the variables of talent management. Contribution: The study gives insights to HR and talent management experts in organizations to improve on their talent management strategies. Originality: The study on talent management attributes and relationship, adds value to the existing knowledge related to talent management in the domain of IT sector in India.

Keywords: talent management, talent acquisition, talent development, talent retention

1. Introduction

Most of IT or Information Technology firms in India have international connections and clients, and the employees in the sector work on global projects. Hence acquisition, management, development and retention of talent in such technology related industry require systematic analysis, planning, set strategies and performance management of their very important asset, Human capital. In India many of the IT firms have grown in their projects and their businesses have grown to meet the demands of the global clients. But at the same time there has been many criticisms that its very difficult to recruit talents that match the business requirement due to lack of required skills and competence among many graduates who come out of many educational institutions in India apart from few top institutions and universities. Once potential employees are selected, they go through rigorous training within a short span of time and is given responsibility of different project tasks. In this hurried recruitment, development and retention of talents sometimes organizations fall in the trap of hasty talent management strategies. This can bounce back in a negative way on to the business.

Talent generally refers to the capabilities, skills and competence, an employee or person possess in a particular field. Talent refers to those people that have high potential, knowledge and skills or who can successfully bring out transformation and alter within the organization with the motto of "keeping people who keep you in business". David Watkins of Softscape coined the word talent management in a corporation in 1998. It is defined because the process of attracting and retaining profitable employees. It also refers to those special steps a corporation adopts to recruit, develop and retain its pool of top talent. The steps adopted should normally be creative and will not project bureaucracy. Talent Management also denotes a deliberate approach by a corporation to select, place, develop and retain people with the right aptitude, competencies, and skills to satisfy not only the present requirements but also future organizational need.

The use of advanced technology is transforming the planet of labour. Transactional work is not any longer getting to be the norm as artificial intelligence based technologies take over the workplace. Work goes to become simpler, smarter and more agile. Keeping the human element during this seamless mesh of men and machines would be the most important challenge of the HR fraternity. This means that the work of the HR professional is much more creative. And talent leaders got to be ready to identify the proper issues to craft the proper interventions. Quite often, organizations adopting a talent management approach will focus on co-coordinating and integrating the following strategies: Talent Acquisition, Talent Development, Talent Engagement and Talent Retention.

The companies have begun gradually to realize that talented employees play a critical role to the success of the organization. Talent management meet the demands that are associated with increased complexity and uncertainty. To achieve sustainable success, a corporation should align these processes with its business

strategies. Having talented individuals on the payroll is one thing; leveraging their capabilities to secure competitive advantage is another.

Ultimately, talent management is not any longer just recruiting, developing, and retaining the proper talent. The new talent equation features a more holistic approach. It is the process of developing in-house leaders who hold the technical and managerial expertise to deliver desired results that align with the business strategy, and the potential to grow with the organization. The new approach is changing the talent landscape at an unparalleled pace. Employees and managers are going to spend longer time and focus to share and collaborate with one another for the greater good of the corporate. Today, talent management focuses on getting their existing workforce able to meet agile business needs.

2. Aim of the study

The aim of the study is to analyze the talent management system particularly in Information technology Industry in Chennai, the IT hub of Tamil Nadu. This study is to peruse, if the workforce is tuned to meet the agile business needs in gig economy and VUCA (Volatility, Uncertainty, Complexity, Ambiguity) world. Since Information Technology companies are from knowledge-based industry, acquiring and managing the best talent is of crucial importance. It's of prime concern that the talent strategies are in line with the overall business strategy involving all the stakeholders of the organisation. The study also aims to analyse, if organizations will succeed in acquiring, training and retaining the millennials & high-potentials, with a targeted talent management strategy. Organizations that develop & engage their employees in creating active talent relationships build long-term value. This study seeks to scrutinize if, organizations adopt talent analytics and focus on creating an engaging experience, that reflects organizational values and culture in a unique way. Even though talent management customs are applied, they can only donate optimally to organisational performance if both top management and employees are aligned on objectives and execution of successful talent management in the modern organization.

3. Need of the study

The collective loss to Indian IT organizations due to regularly losing its employees is mind boggling. With the business world getting increasingly automated with artificial intelligence, robotics, big-data, employees have to accommodate to the newer roles and skillets with a channelised talent strategy. In the last two years, modern organisations have to acknowledge the fact, that the salaries are significant to employees, but that reward alone cannot stimulate the highly skilled and experienced workforce. The HR managers are laying the road map for the proper working conditions which might inspire the workers to be engaged, give their best, go extra mile and persist in the face of difficulties.

The major challenges faced by the top level management are therefore not retention of talented workforce, but in engaging them. The conflict for talent is more powerful than ever. Just when organizations begin to adapt the stress of millennials, their successors and Generation Z are able to fire up a storm. Now, Human Resource executives are not just competing against other employers–they are also battling demands from their potential recruits. Since bots are getting introduced to handle repetitive and process-driven tasks, there is dire need of Intrapreneurship enabling globally dispersed teams to seamlessly collaborate and communicate faster.

4. Statement of problem

Companies are hostile to rework their businesses to satisfy the urgent call of digitalization. 67 per cent of leaders believe their businesses must become considerably more digital to be competitive, but often digitalization strategies could also be too underdeveloped to be truly transformative. In today's volatile competitive context, and covid pandemic scenario, leaders need to see that the skillful and entrepreneurial management of talent will be important to organization's future success as management of their financial resources. Talent management is extensively adopted by multinational companies, which are operating in India, though, most Indian companies are either currently or soon they adopt the talent management practice. They are dealing with problems whether talent management is an offshoot of Human Resource processes or an independent developmental process, and how it will produce a competitive advantage and enhance employee engagement. This study shows how the framework of talent management processes on an organization wide scale – not confined to the HR function – can support organization retention and development.

5. Objectives of the study

- To analyze the level of talent management system (talent acquisition, talent development, talent engagement and talent retention) as opined by the respondents of selective IT organizations.
- To examine the relationship between different attributes of talent management system (talent acquisition, talent development, talent engagement and talent retention).

6. Limitations of the study

The study is restricted to Chennai region and may not be applicable to other regions. Collection of data was strenuous as IT professionals were busy with their project schedule. Few respondents were highly reluctant in spending time for providing data. The opinion of the respondents may vary with on-site or other project groups and with different time-frame. The findings of the study cannot be generalised to other industries and a comparative analysis between other industry verticals has not been incorporated. The inference may vary to a wider population of their subsidiaries in the global context. In the era of digital disruption and technological revolution, this study cannot be generalized to emerging start-up companies.

7. Information technology in India

Information Technology in India has increased its contribution to the country's GDP from 1.2 per cent in 1998 to 7.7 per cent in 2017. According to NASSCOM, the Information Technology sector aggregated revenues of 160 billion US Dollars in 2018, with export revenue of 99 billion US Dollars and domestic revenue of 48 billion US Dollars, growing by over 13 per cent. The United States accounts for two-thirds of India's IT services exports. The worldwide sourcing market in India continues to nurture at a superior velocity compared to the IT- BPM industry. India is the leading sourcing destination across the world, accounting for approximately 55 per cent market share of the US$ 185-190 billion global services sourcing business in 2018 - 2019. Indian IT & ITeS companies have set up over 1,000 global delivery centers in about 80 countries across the world. India has become the digital capability hub of the world with around 75 per cent of global digital talent present in the country.

Chennai is the second largest exporter of Software in India next to Bangalore. It has the largest operations for India's top software company TCS, Infosys (has world's largest development center with 25,000 employees in Mahindra world city near Chengalpattu), many centers in IT corridor, and other CMMI-level 5 companies have their head-offices, regional-offices and development centers here.

8. Growth of the Industry

In the times economy, India is that the largest exporter of IT. Exports dominate the Indian IT industry and constitute about 79 per cent of the industry's total revenue. However, the domestic market is additionally significant, with robust revenue growth. The company’s share of total Indian exports (merchandise plus services) amplified from but 4 per cent in financial year 1998 to about 38 per cent in financial year 2019. The technologically-inclined services sector in India accounts for 40 percent of the country's GDP and 30 percent of export earnings as of 2006, while employing only 25 percent of its workforce, consistent with Sharma (2006). consistent with Gartner, the "Top Five Indian IT Services Providers" are Tata Consultancy Services, Infosys, Cognizant, Wipro, and HCL Technologies

9. Review of literature

Inclusive and exclusive talent management strategies are used by organizations as there are global skill and competency requirement and there is scarcity of the same in the organizations. Hence organizations transform both global challenges and existing negative factors within the context of organization into opportunities. It is important to identify and select an appropriate strategy for talent management (exclusive, when some of the talents exist outside the organization and they are bought, or inclusive, when anybody can be potential talents if they are developed and hence internal development of employees and new recruits), as well as to investigate the practical application of these strategies by evaluating the features of different industries (Hartman et al. 2010; Rothwell 2012; Schuler, Jackson 2014; Meyers, van Woerkom 2014). According to Savanieviciene et al (2017) : the features characteristic to inclusive talent management strategy dominate in the companies of manufacturing, banking, catering, consulting, trade, energy, transport, and agribusiness industries. In the company of technology industry, features of a mixed (having both exclusive and inclusive) talent management strategy are apparent.

Bibi (2019), studied to work out the effect of talent management practices on employee performance among employees working in healthcare organizations of Pakistan. The sample of the study was comprised of 364 employees working in healthcare organizations to work out the performance of employee due to talent management practices. The outcomes of the research exposed a significantly positive outcome of talent management practices i.e. recruitment and assortment for talent attraction, coaching and mentoring for learning and enhance of talent, compensation for retention of talent on workforce performance.

Syed Mansoor Pasha and Badiuddin Ahmed (2017), analysed that the service sector and knowledge Technology sector is heavily people driven and hence require proper management of its employees. Talent management is vital practice to urge the proper manpower within the organization. The influence of talent management strategies has shown notable effects on outcomes and productivity of modern organization and workforce. Proper alignment of Talent management strategies with organizational goals and creating a culture where employees work valued are going to be helpful to sustain within the competitive environment for long period of time.

10. Research methodology

The research objective for this study includes exploration and outline. The exploratory research enables the researcher to realize insight into the research topic, to clarify central concepts and constructs and to develop methods, which has got to be used within the study. The descriptive research allows the researcher to live and report the occurrence with which specific variable occur within the sample to present a picture of the facts of a condition or relationship. The information collected for the study includes primary and secondary data. Primary data are those which are collected, as fresh and for the primary time and happen to be original in character. This research has an applied questionnaire because the research instrument for collecting the information. The pilot study was conducted with the assistance of the structured questionnaire which was administered among the sample of fifty respondents. The Cronbach's alpha for talent management system is 0.854 the calculated overall reliability coefficient has exceeded 0.8 and appears to be consistently high across the whole variables.

The study is descriptive in nature. Consistent with Software Technology Parks of India, Chennai Chapter (Source: www.stpi.chennai.in), there are around 460 registered software companies in Chennai. The researcher has adopted some 20 best performing IT companies in Chennai for the study. These companies are considered supported company performance, growth trend, client base, market presence, skilled talent, training interventions, large scale projects of various industry verticals. Therefore the researcher considered the target population to be infinity. Sampling was adopted, to pick the samples for the study. consistent with the Demorgan's table for an infinite population 663 sample sizes is required with a confidence level of 99 percent and with the arrogance interval of 5 percent. The researcher gave around 700 questionnaires and 674 questionnaires were returned and answered. The remaining 26 questionnaires were returned and located to be biased and unanswered. The subsequent statistical tools like Measures of Central Tendency and Dispersion (Mean and Standard Deviation) and correlation.

11. Analysis and interpretation

Table 1: Mean and standard deviation of talent management process

Measuring Items	Mean	Sd
Talent Acquisition	3.21	.405
Talent Development	3.51	.503
Talent Engagement	2.84	.380
Talent Retention	2.61	.489
Mean Score	**3.01**	**0.121**
**** Sources – Primary data***		

The respondents agree with the dimension "talent development" with a central tendency value of 3.51 and a dispersion value of 0.503. In the same way the respondents agree with the dimension "talent acquisition" with a central tendency value of 3.21 and a dispersion value of 0.405. While the respondents are having a neutral feel towards the dimension "talent engagement" with a central tendency value of 2.84 and a dispersion value of 0.380. And in the same way the respondents are having a neutral feel towards the dimension "talent retention" with a central tendency value of 2.61 and a dispersion value of 0.489.

Table 2: Relationship between the variables of talent management

H_0: There of no significant correlation between the variables of talent management.

		Talent Acquisition	Talent Development	Talent Engagement	Talent Retention	Talent Management
Talent Acquisition	PC	1				
	Sig.					
	N	674				
Talent Development	PC	.076*	1			
	Sig.	.048				
	N	674	674			
Talent Engagement	PC	-.015**	.094*	1		
	Sig.	.704	.015			
	N	674	674	674		
Talent Retention	PC	.066	.060	-.008	1	
	Sig.	.085	.119	.833		
	N	674	674	674	674	
Talent Management	PC	-.063	-.052*	-.045*	-.026*	1
	Sig.	.105	.174	.247	.493	
	N	674	674	674	674	674
. Correlation is significant at the 0.01 level (2-tailed).						
. Correlation is significant at the 0.05 level (2-tailed).						
PC - Pearson Correlation						
N – Number of Respondents						

Correlation Results: The independent variable like "Talent Acquisition" shows positive non-significant linear relationship with the dependent variable like "Talent Development" (r = 0.076). The independent variable like "Talent Development shows positive non-significant linear relationship with the dependent variable like "Talent Engagement" (r = 0.094). There is a significant and negative correlation between talent management as dependent variables and independent variables- Talent development (-.052*); Talent engagement (-.045*) and talent retention (-.026*).

No Correlation - The independent variable like "Talent Acquisition" shows no linear relationship with the dependent variables like "Talent Engagement", "Talent Retention" and "Talent Management". The independent variables like "Talent Development shows no linear relationship with the dependent variables like "Talent Retention" and "Talent Management". The independent variables like "Talent Engagement" show no linear relationship with the dependent variables like "Talent Retention" and "Talent Management". The independent variable like "Talent Retention" shows no linear relationship with the dependent variables like "Talent Management". The negative and significant correlation between total talent management score and talent retention, talent development and talent engagement is interesting finding in relation to the population studied.

12. Conclusion

This paper basically give an understanding of relationship between talent retention, talent development and talent engagement. This study shows how the adoption of talent management processes on an organization-wide scale not confined to the HR function can help the organization improve engagement & retention. Based on the study, we understand that information technology Companies have to further strategize their talent management process for enhanced business outcomes. True best-in-class assessment strategies involve not only selecting the right tools, but also integrating them with the rest of the company's talent strategy to guide decision-making throughout the employee life cycle. Suggestions have been incorporated to effectively manage the talents in an ever-changing digital space.

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Rethinking Cultural and Creative Entrepreneurship Education

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Abstract: For a number of creative graduates, self-employment, micro-entrepreneurship and freelancing is the main pathway to a career in the cultural and creative industries (CCI). In response, creative degrees have adapted their curriculum to include knowledge and skills associated with entrepreneurship, to prepare learners for CCI labour markets. But entrepreneurship education for creative graduates has distinctive characteristics, informed by an understanding of CCI, producing a context specific curriculum and pedagogy. In this paper, we consider models and methodologies for a contextualised entrepreneurship education aimed at students on creative degrees, which aims to develop skills and knowledge for entrepreneurship while engaging critically with CCI entrepreneurship. This potentially contradictory position builds on a critique of cultural and creative work, sometimes described as 'forced' entrepreneurship which highlights significant constraints, insecurities and precarious work conditions. The tension between learning about entrepreneurship and critical questioning of its paradigms, is also situated within an increased emphasis in Higher Education on learning to be enterprising, often identified as a key factor for student's future career success, whether working for yourself or as an employee. In equipping creative graduates for the challenges and realities of cultural and creative labour markets, entrepreneurial learning and teaching is framed through social, political and economic debates. This paper draws on innovative pedagogies that make use of exploratory approaches, such as the use of participatory, visual and creative methods. These approaches can enable students to utilise different values, strategies and reflexive processes and can assist in opening up space to interrogate and engage critically with cultural and creative entrepreneurship. In applying entrepreneurship education to a discipline outside of a management and business school context, we problematise common assumptions, norms and discourses regarding entrepreneurship curricula and pedagogies. This paper contributes to debates which seek to review entrepreneurship education, embracing contradictory positions to shape new perspectives by considering students' engagement with entrepreneurship curricula in higher education and reflecting on the broader CCI labour context.

Keywords: cultural entrepreneurship, creative entrepreneurship, micro-enterprise, innovative curriculum, learning and teaching

1. Context for entrepreneurship education in the cultural and creative industries

This paper explores the opportunity to review entrepreneurship education. Drawing on innovative pedagogies it considers a Cultural and Creative Industries (CCIs) specific context but offers the potential to influence approaches to enterprise education in general. Entrepreneurship education in cultural and creative curricula is still relatively new, having emerged around the early 2000s, at the same time as when governments around the world began to review the significance of what has become known as the 'creative industries' (Hesmondhalgh, 2008). In Europe, for instance, it soon became recognised that cultural and creative fields act as principal drivers of economic and societal development (European Commission, 2006). In time, the rise of the economic and social impact of the CCIs began to influence higher education (Ashton and Noonan, 2013; Gilmore and Comunian, 2016). It has been argued that the CCIs contribute to the regeneration of cities and regions (O'Brien, 2013); to the construction of national and local identity (Comunian et al, 2010); and to wellbeing and social life (Banks, 2017). Significantly for creative entrepreneurship education, governments made and continue to make the economic case for the CCIs (see Creative Industries Council, 2021) suggesting the need to encourage good business models, a strong ecosystem (Neelands et al, 2015) and support for CCI entrepreneurship. In turn, policy makers have urged Higher Education Institutions (HEIs) to address the entrepreneurial capacity of learners from creative subjects such as art, design, media and creative performance (Clews, 2007). Indeed, HEIs have been recognised as playing a pivotal role in contributing to business capacity in the CCIs (Dervojeda et al, 2013), through offering courses that are deemed to adequately meet the needs of the creative economy, which are identified as requiring competency in both technical and business skills (Bakhshi, Hargreaves & Mateos-Garcia, 2013).

As a result, universities have developed a range of diverse interventions, enabling careers teams to provide: business plan writing workshops in arts faculties; modules about running a business and understanding markets; and guest speakers talking about their experience of self-employment in the CCIs. In fact, both non-formal and

formal enterprise educational offerings are reflected in the wider landscape of enterprise education in HE, where non formal provision has become well-established (Williamson, Beadle and Charalambous, 2013). However, in terms of formal provision in creative subject areas, this work has often developed as part of Professional Practice modules, introducing elements of entrepreneurship to the curriculum which draw heavily on the personal experiences of academics as CCI practitioners (England, 2020). Although well intentioned and often useful, this curriculum has developed in a relatively ad hoc manner, with little opportunity to draw on or develop academic research. Furthermore, variance in the use of different entrepreneurship education modes (referring to learning for/about/through entrepreneurship, the latter identified as offering greater transformative potential) produces different emphases on developing knowledge, skills and attitudes, which shapes methods of 'instructional design' and impacts critical aspects of pedagogy (Kakouris & Liargovas, 2020). In the UK, the opportunity to reflect on creative enterprise education and establish a community of practice, emerged with the support of organisations and events such as International Enterprise Educators Conference and the International Small Business Conference, which formed creative industries tracks at conferences and began to pay attention to the CCIs in terms of creative enterprise curricula and pedagogies.

At the same time, scholars from disciplines such as cultural studies, explored the characteristics of CCI work, raising concerns with the precarious nature of this work and evidence of inequalities in the sector (Banks, 2017; Hesmondhalgh and Baker, 2011; O'Brien and Oakley, 2015). Critical debates suggest that neoliberal agendas in HEIs (Banks and Hesmondhalgh, 2009) reflect a curriculum which tends to prepare students as 'industry-ready', nurturing enthusiasm for CCI work but paying little attention to critical debates such as the challenging working conditions in the sector (Ashton and Noonan, 2013). The common neglect of these disparities, within an educational approach that appears to work in service of creating workforce pipelines for industry, has a similar tendency to overlook the lack of workforce diversity and under-representation of particular groups in the CCIs (Spicer and Presence, 2017). Given these realities of CCI work, it is especially pertinent that learning should therefore extend beyond celebratory and liberatory accounts of enterprise culture, enabling students to critically examine entrepreneurial paradigms (Royle & Mathee, 2017).

Furthermore, the impact of the Covid-19 pandemic on the CCIs cannot be ignored by educators who are only too aware of the difficulties faced by creative graduates from 2020 and 21 cohorts, as they attempt to navigate the world of work. Scholars who are beginning to discuss the state of the CCIs during the pandemic, such as the recently published Special Issue of Cultural Trends (Banks and O'Connor, 2020), question current economic models and the sustainability of the sector. This analysis suggests an opportunity to re-imagine cultural work and in turn, an opportunity to reflect on what a creative enterprise curriculum could offer in very challenging times.

In this paper, we grapple with these conflicting positions as we reflect on pedagogies which seek to encourage creative entrepreneurship alongside a critical engagement with the very idea of entrepreneurship for the CCIs. We therefore consider how HE educators might work to create opportunities for learning about creative enterprise and entrepreneurship by enabling students to explore and navigate this apparent paradox. Building on creative enterprise teaching materials, such as Nesta's Creative Toolkit (2007) we investigate different routes into entrepreneurship education. We suggest approaches which could result in teaching skills for enterprise while re-inventing entrepreneurship education.

2. Method

The authors draw on their extensive experience as creative entrepreneurship educators (from 2007 until now, each at different HEIs), but with a focus on a recent project entitled 'Unexpected Enterprises', to illustrate processes and ideas in practice.

The case study illustrates a variety of exploratory pedagogic approaches emerging from a 2018-19 research project, 'Unexpected Enterprises', undertaken by Emma Agusita and Daniel Ashton. The project employed participatory and design research methodologies in order to support collaborative co-inquiry and co-design involving creative subject students, enterprise educators and entrepreneurs working in CCIs in the UK, so that emerging entrepreneurial forms and their implications for higher education teaching and learning about creative enterprise could be examined (Agusita & Ashton, 2020a). The project considered how new modes of CCI work, which frequently make use of digital technologies, are being generated by enterprising activities that typically

fall outside traditional notions of enterprise and entrepreneurship, giving rise to 'unexpected enterprises' (Ashton, 2017).

As academics involved in the design and delivery of creative entrepreneurship curricula, our methodology is influenced by action research methods, engaging in discussions with our peers and ongoing reflexivity as educators (Robertson, 2000). Furthermore, where this work has involved participatory action-oriented approaches, active collaboration with learners as participants was sought (McNiff, 2002), reflecting a 'with' not 'to' approach, that is generative and acknowledges multiple viewpoints (Arnold & Norton, 2018) within educational research processes.

3. Findings and critical discussion

Although working at different institutions and across a diverse range of art, design and media courses, the authors have developed curricula which share three key findings. Firstly, the student's creative practice is at the heart of their exploration into entrepreneurship, prioritising the individual's creative values over entrepreneurial outcomes. Secondly, reflection is embedded in the learning experience encouraging the student to engage critically with creative entrepreneurship rather than accepting it as a fait accompli. Finally, creative entrepreneurship is taught through experimentation, making and practice-based pedagogies, such as the use of participatory, visual and creative methods.

4. Creative practice

For creative subject students, entrepreneurship is secondary to their creative practice. In many ways, it is merely seen as a vehicle for continuing their creative practice beyond university, so that often, cultural entrepreneurs are effectively 'pushed' into entrepreneurship (Oakley, 2014). With that in mind, the route to entrepreneurship can appear circuitous rather than linear and strategic. Beavon (2012) argues that it might be more useful to think of nascent creative entrepreneurship as a 'set of complex "journey shapes"' (p.12), a process which reflects ongoing tensions and negotiations between entrepreneurial and creative identity. A diverse range of values (social, moral and political) and aesthetic priorities are balanced, as nascent creative entrepreneurs emerge and develop their potential enterprise. As Nesta's Creative Toolkit (2007) identified, when working with creative practitioners it is important to start with personal creative values and to actively connect those to entrepreneurship.

Students who do not identify with stereotypical entrepreneurs find it helpful to approach entrepreneurship by discussing identity, personal values, networks and community from the point of view of their lived experience. Given this potential dissonance when encountering dominant representations and models of enterprise and entrepreneurship, a more attuned and relevant approach is, therefore, key. For example, languages, definitions and core knowledges associated with traditional forms of entrepreneurship education are often contested by educators and learners in creative subject domains whose notions of professional ambition and identity are more divergent and heterogeneous (Kellet, 2006; Clews, 2007; Penaluna, Penaluna & Jones, 2012).

Pedagogical considerations identified in the case of the Unexpected Enterprises research project reflect these ideas. For instance, it was found that creative subject curriculum design should encourage and enable learner's critical reflections on: language, culture and discourses surrounding entrepreneurship e.g., facilitating reflective learning activities which encourage learners to critically explore assumptions about the role of creativity in entrepreneurship (Kakouris, 2021); perceptions, identifications and the negotiation of tensions and conflicts in personal/professional identities as they relate to entrepreneurship; values associated with entrepreneurship (as well as *how* entrepreneurship is valued); sociality and networking in terms of considering *relevant* resources, processes and connections for creative practitioners; pivotal experiences encountered by creative entrepreneurs (shared through life stories that reflect a diversity of journeys) recognising a wider range of opportunities for professional empowerment and progression (Agusita & Ashton, 2020a).

5. Reflection is embedded in the learning experience

Reflective practice is common across practice-based creative courses as a means of encouraging students to think critically about their work and to contextualise their practice (Moon, 2005). For example, a central tenet of communication, media, film and cultural studies education is to develop "student's creative and reflexive capacities" (QAA, 2019, p.6). In that sense, it is not unusual for creative students to engage in critical reflection; to step away from their work and try to assess its merits by comparing, evaluating and presenting alternatives.

In developing a practice-based approach to an enterprise curriculum, individual and collective reflection encourages a critical engagement with creative entrepreneurship, offering the possibility for imagining and re-imagining the characteristics of creative enterprise. This approach, based on mutual investigation and a dialogue which includes all members of the group, echoes John Dewey's suggestions in Experience and Education (1997), encouraging dialogue and critical thinking.

In the case of the Unexpected Enterprise project, learners were engaged in reflection on the significance of evolving practices and ideas about creative enterprise and entrepreneurship, as part of an experimental critical design process that considered the changing nature of creative work, leading to recommendations for pedagogic innovation. The process began with an Open Innovation Lab (OIL), a collaborative process tool, emerging from business development approaches, adapted as a pedagogic resource for creative entrepreneurship (Stenvall-Virtanen et al, 2016). The lab brought together students with educators and entrepreneurs to critically reflect on the current landscape of creative entrepreneurship with the aim of generating ideas to inform teaching and learning. Furthermore, a subsequent phase of the project piloted teaching approaches, which introduced undergraduate media subject students to examples of hidden, less visible and marginalised forms of entrepreneurship, offering a challenge to, and transgression of narrow perspectives of creative and cultural entrepreneurship (Naudin, 2018). Analysis of these pedagogic activities produced a set of pedagogical considerations offering a framework for critical exploration of creative entrepreneurship (Agusita & Ashton, 2020a), that could be used for curriculum design. Informed by these considerations, three learning activity themes were identified, based on their potential to enable critical exploration of established ways of approaching entrepreneurship teaching and learning, and tested out in subsequent innovation workshops, involving creative and media postgraduate students, educators teaching business, creative and cultural studies, and participants with creative and cultural industry experience.

The themed activities involved the following: 1) exploration of a self-promotion theme through a self-audit of social media use (encouraging evaluation of use for personal and professional representation) and creation of a professional social media profile for an aspiring creative media professional (encouraging reflection on the challenges of constructing professional identities); 2) exploration of a theme of spaces and networking through generating ideas for and representation of assets and resources that enable the creation of accessible and inclusive working environments for creative and cultural practitioners, leading to a collective mapping process where ideas were discussed and prioritised according to their perceived value; and 3) exploration of a business planning theme through examining strengths and weaknesses of current approaches and materials, followed by the generation of ideas for approaches and materials that may help to plan and visualise creative work in more useful and effective ways. Analysis of the OIL and teaching pilot activities, had also identified the potential value for learners of engaging with the career narratives and biographies of participating entrepreneurs, which reflected many of the conflicting issues and debates highlighted by the literature, so as a precursor to the themed activities, groups were given example stories and asked to reflect on enablers and barriers which entrepreneurs encountered.

It was a finding of the research project that these themed reflective learning activities, as well as the set of pedagogic considerations, offer ideas and resources for critically examining existing paradigms of creative and cultural entrepreneurship and for thinking of other ways to develop relevant and engaging learning experiences. In other words, they can assist in challenging existing approaches and encouraging new ones. Specifically, the research found that engaging with: 1) entrepreneurial life stories which are 'unexpected, accidental and complex' (Agusita & Ashton, 2020a, p.31), offers opportunities to question and consider the nature of creative work, who does it, what challenges and contingencies this might present and what social, cultural and economic factors are involved; 2) a remix approach to business planning processes can offer space to critically examine conventional norms and identify different starting points for ideas generation and career pathways; 3) approaches to self-promotion and branding that provoke questioning of extant protocols and materials offer the chance to reconsider ways to profile and present professional identities and reconceptualise an entrepreneurial self. For instance, when discussing marketing, creative students often respond very well to discussing how they promote their own blogs, music events and other creative activities, but they find it difficult to focus on studying marketing theories and strategies; and 4) processes of reimagining creative and cultural work spaces and networking can offer the chance to reflect on ways in which spaces can be made more inclusive and accessible and on how networking opportunities might be evolved to reflect more fluid, less formal and more agile ways of connecting and collaborating. This might be more suitable for CCI work as well as addressing

barriers, mitigate against some issues of precariousness and provide relatively low risks for nascent entrepreneurs.

6. Practice-based pedagogies

In art, design and media faculties, participatory practices, and visual and creative methods fit neatly with the students' experience of learning and teaching. To illustrate, the selection of activities aimed to encourage pedagogic experimentation in the Unexpected Enterprises project, were chosen in order to develop approaches more suited to the needs of creative subject students (Kellet, 2006), with the aim of offering engaging, relevant, interactive, experiential and inspiring learning experiences (Clews, 2007). Building on previous research work that aimed to experiment with subject focus, content and style of teaching and learning about creative entrepreneurship (Stenvall-Virtanen et al, 2016), the project researchers used design thinking methods, inspired by Tshimmel et al's (2015) constructive design research (drawing on Koskinen et al, 2011). It was found that, this methodological use of a design approach, which mobilised creative and participatory methods to iteratively explore and reframe the subject matter, can prompt critical thinking by learners. For example, in the innovation workshop activities previously described, participants worked in small groups, using visual tools and creative methods. These approaches included, use of collaging by participants in order to make a Do-It-Yourself (DIY) publication that explored new ways of engaging with business planning, and asset mapping, an approach evolved from community development approaches centred on creative engagement and collaboration (Alexiou et al, 2016). This was used by participants to think imaginatively about environments for creative and cultural work, through first modelling ideas in plasticine and then physically mapping these into a model denoting their significance, enabling collective reflection. Moreover, the research project identified that the use of such methodologies, employed to encourage learner's critical and creative exploration of creative enterprise and entrepreneurship, therefore support pedagogic approaches and resources that seek to contest and remix conventional approaches, offering reimagined and alternative approaches with pedagogic potential for 'developing a context to question what creative entrepreneurship is' (Agusita and Ashton, 2020a, p.4; Agusita and Ashton, 2020b).

Furthermore, innovative use of visual material and making as an aspect of learning was found to break down barriers with, for example, for international students and students with varying learning abilities. Drawing on creative skills in design, media production and other creative practices, students present their entrepreneurial learning using a diverse range of tools and resources. The use of processes which require students to demonstrate skills in problem solving, visualising ideas and collaborative work, can shift the dynamic in a class. In this context, entrepreneurship education is understood as a set of practices, methods and theories in which the co-creation of knowledge is valued over knowledge transfer from educator to students.

7. Conclusion

In this paper we explore entrepreneurship education in the context of the CCIs to inform an understanding of creative enterprise, but also broader entrepreneurship education practice. As educators, it is important to note that entrepreneurship education, in addition to the core subject, can be a burden as part of what is already a full curriculum. However, in the case of the CCIs, many of the courses are vocational and in that sense, employability and entrepreneurship are integral to the core subject. Students future careers in the sector are dependent on a level of confidence and skills in entrepreneurial practices (Bridgstock, 2019 and England, 2020). This may differ in other arts and humanities courses, such as history for instance, where the subject is not vocational and making the case could be more challenging.

The idea of a remix, to reimagine entrepreneurship could be perceived as reinventing the wheel, which may not be welcome. While our research suggests this is particularly beneficial for creative students it might be less relevant to disciplines which emphasise academic and theoretical knowledge. It can result in a less sophisticated understanding of entrepreneurship as, inevitably, there is little time to focus on a range of specific theories and methods from entrepreneurship, management and business studies. This can result in a superficial understanding of core knowledge for entrepreneurship, potentially restricting the nature of the learning experience.

There are challenges in combining a curriculum and pedagogy which teaches for entrepreneurship while simultaneously engaging with a critique of entrepreneurial modes of work. In some cases, students welcome these contradictions while others find the ambiguity difficult to grasp. Creative students, with only a few years

to hone their creative skills, can reject anything other than the creative subject they came to study. For instance, why should a jewellery designer learn marketing skills when they want to focus on creativity, computer aided design, knowledge of materials, diamond grading and jewellery finishing techniques? Furthermore, for many, myths of bohemian and artistic lifestyles play a role in rebuffing ideas of business and enterprise (Eikhof and Haunschild, 2006; Naudin, 2018). Drawing on the relationship between DIY cultures, creative activism and community arts can help students make sense of entrepreneurship, while acknowledging a possible unease with market driven and commercial practices.

There are limitations to the methods and tools considered in this paper, in relation to addressing the contradiction discussed. None the less, we have found that these approaches can be used to create an environment for experimentation, for 'unexpected enterprises', and for reviewing and exploring what entrepreneurship education can offer a creative curriculum and vice versa.

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Model of «Short Cycles» as an Innovation in Industry

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Abstract: Industry 4.0 is already a common term. Modern development of the world community, characterized by the highest speed with which changes occur, globalization of markets, transition from centralized business models to open ones, from forms of competition to cooperation, commitment to network structures, increasing importance of satisfying individual consumers, and development of information and communication technologies, dictates new conditions for organizing successful production activities. In current reality production organization has an essential characteristic, reflecting the concentration at the stage of product development. The aim of this study is to analyze model of «short cycles» as an innovation for industry and to relate it to the current state of the industrial development in Russia. It is innovative model based on an incremental-iterative product development model. It is built on the Deming cycle. Theoretical and practical aspects of this concept are given. The case of model of «short cycles» implementation in industrial sector of Russia is presented. PJSC Severstal is one of the best competitive examples of global companies implementing effective modern production management concepts in Russia. In 2017, company launched a major innovation program aimed at ensuring business growth without a significant increase in production volume. This program focuses on creating of innovative products. Today, reducing time to market is a key driver of success. Summarizing, this model can be considered as promising for companies of the industrial sector of Russian economy. This study is a value for researchers in the field of industrial economics and practitioners.

Keywords: innovation, model of «short cycles», product development, Russian industry

1. Introduction

Industry 4.0 is spreading at an enormous pace and has a significant impact on various processes in society, including the production sector (Schwab, 2017). In recent years, a new competitive environment has been developing for the manufacturing industry and the service sector, which leads to a change in the management of industrial enterprises. To succeed in a highly competitive and turbulent environment, businesses will need significantly improved competencies in terms of new business models, strategies, management principles, processes, and technological capabilities. All possible efforts must be integrated. Various forms of integration are very popular measure of efficiency in industry. Integration has significantly affected the conditions for implementing competition policy, which are characterized by the ability to implement innovations in economic development at the macroeconomic level, rapid technological changes leading to the creation of a knowledge economy and increasing the competitiveness of the national economy on an innovative basis. The essence of integration processes in industry is the formation of a new unity.

In the early 2000s, the National Research Council of the USA identified the main tasks for industrial companies, which represented gaps in practice and determined the vision of production in 2020 (Camarinha-Matos et al, 2009):

- rapidly restructure production facilities in response to changing needs and opportunities;
- ensure concurrency of operations;
- integrate human and technical resources to improve workforce efficiency and satisfaction;
- "instantly" transform information gathered from a wide variety of sources into useful knowledge for effective decision-making.

These tasks are extremely significant for the current state of the industrial sector in general, and in particular, Russian industrial sector. Now, an industrial enterprise faces a number of challenges. Along with those that have already become typical, which consists in achieving high quality of products and minimal costs, the following are becoming important:

- reduction in time to market;
- increase in the rate of flow of production processes;
- wide variety of product range;

- accurate customer satisfaction;
- use of the latest technological advances.

Now, great attention is paid to saving time in the course of production and sale of products. This is due to an increase in the degree of unpredictability and market instability, fulminant changes in technology and increased competition. This dynamic and challenging environment requires the implementation of innovative product development concepts to reduce development cycle time and improve product quality and value. It is based on the integrated design of products and manufacturing and support processes. It extends design cycle time and reduces other cycles. All of the competitive benefits must be considered from the very start of product development and designed into the product. One of the reasons an integrated product development is successful is that the process drives toward optimized and robust designs. Many tools are available for the cross-functional team, such as design of experiments, failure mode and effects analysis, and lessons learned reviews.

So, the purpose of this research is to offer product development concept - model of «short cycles» and analyze it as an innovation for industry and to relate it to the current state of the Russian industrial development. This study was conducted in order to identify effective innovative models for industrial enterprises that increase their competitiveness in the realities of the fourth industrial revolution.

2. Literature review

In the new realities, the winner in the competition is not the one who is larger or has a long and successful history of development, but the one who will quickly bring a new product to the market and retain the favor of customers. Borovkov (2019), facilitator of scientific and technological progress, confirms: "The key thesis is time to market. We are now seeing windows of opportunity slam shut for entire corporations and industries. The window existed for a year or two, during which time it was necessary to have time to enter the market. If for some reason this did not work out, we will have to wait for the next window." In an effort to cope with market instability, companies look beyond the advantages in terms of cost. Speed, quality and agility are emphasized as a means to meet the unique needs of customers and markets. Suri (1998, 2010) proposed the concept of quick response manufacturing. It means responding to customer requests so that you can quickly develop and release products that are responsive to those requests. This concept is based on the continuous reduction of the time required to perform all types of activities in the company, while ensuring quality improvement, cost reduction and faster response to changes in the situation. Schonberger (2012) argues that the leading production concept should contain the word "time", indicating the transience of changes in the external environment. According to P. Kidd (1994), the fundamental resource for an agile enterprise is "knowledge". People should be united in dynamic teams formed around well-defined market opportunities so that they can use each other's knowledge. Through this process, knowledge is transformed into new products and services.

The winners in the fast-changing world of manufacturing will be those companies that have mastered the agility needed to create rapid and continuous customer-focused innovation.

Christensen (2015) identifies supportive innovations that contribute to product improvement, and disruptive innovations are innovations that provide lower product quality in terms of basic technical characteristics, at least in the near future. Disruptive innovations bring completely new offerings to the market. These products have different properties and are valued by certain – usually new-consumer groups. Products created on the basis of disruptive innovations are usually cheaper, simpler, smaller and easier to handle. These characteristics may be typical, but not necessary, characteristics of disruptive innovation. According to Danneels (2004), disruptive innovations change the basis of competition, because they bring to it an aspect of efficiency in which products have not previously competed. Customer needs determine which performance indicators form the relevant basis of competition. At any given time, a particular technology has performance limits that limit the current set of product attributes. New products based on disruptive innovation have different attribute sets from existing products. These new products initially have lower performance in terms of size relative to the main market segment, but have higher performance in terms of size estimated by remote or developing market segments. However, the performance that the technology allows to increase over time, and ultimately the performance levels offered by the disruptive technology, meet or exceed the minimum levels required by the mainstream market.

Developing the idea of the network model of innovation (Gloor, 2006), which consists in the joint creation of innovations by participants of various network communities who enter into a collaborative relationship and form

a certain ecosystem. And also, taking into account Edquist's (2005) position on the collective nature of innovation, based on the interaction of firms with other organizations, we can conclude about the genesis of disruptive innovations through the implementation of the "short cycles" model. The attractiveness of technological opportunities lies in the very strong correlation between market needs and the functional properties of the product, achieved through the use of this model, which affects the distribution of competitive forces.

3. Methods

The modern organization of production has an important characteristic that reflects the concentration at the stage of product design. The complex nature of the product, coupled with a high degree of customization, confirms the validity of focusing on the pre-production stage.

The model of "short cycles" is an incremental-iterative model of product development, which is based on the Deming cycle (PDCA) (Deming, 1982). It means a commitment to a culture of continuous improvement. Each cycle of development process is a mini-project and includes all the necessary range of operations: design, prototyping, testing, evaluation of results. This project is divided into the required number of "short cycles" depending on the identification of the most appropriate prototype. Standard procedure for product development often consists of one big cycle. It allows to visualize the scale of work and explain to the customer what characteristics the finished product will have. The duration of each cycle is about 1-4 weeks. The principal feature is the ability to influence each stage of the "short cycle" at any time (figure 1).

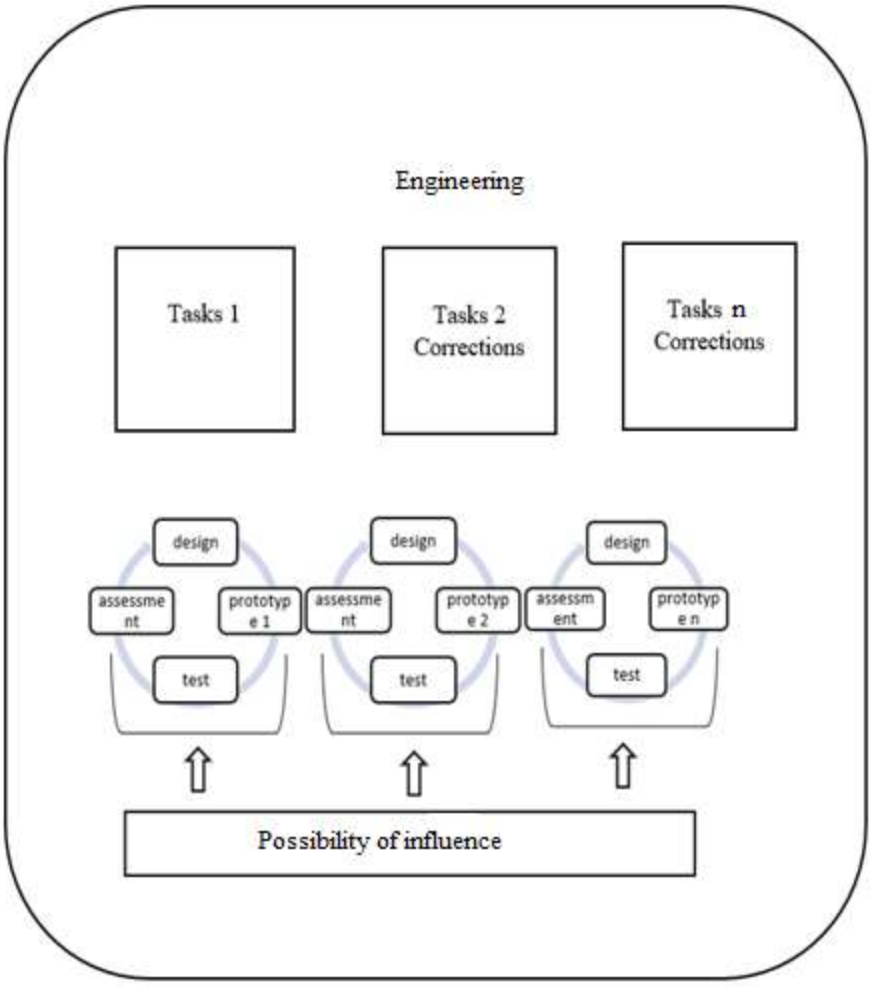

Figure 1: Visualization of the model of "short cycles" (Source, Own work)

Cross-functional team consisting of highly qualified specialists from different production process stages (in other words from various fields of knowledge) and in cooperation with the customer develops a prioritized list of tasks for the upcoming cycle (with the exception of the first cycle, where there is virtually no feedback, the chosen

concept prevails). The basic rule is that if the cross-functional team has agreed on a certain number of tasks that need to be performed in one cycle, then it is impossible to add new ones. Small groups of end users have the opportunity to get acquainted with the new prototype and provide feedback. At the end of each "short cycle", a stakeholder assessment will be conducted. It will result in a list of tasks for the next cycle, highlighting the adjustments received through feedback and based on the discussion of the results by the cross-functional team.

Frequent and fast releases are not a new idea, it goes back to the idea of evolutionary development proposed by T. Gilb (1988). According to this scholar, "evolution is a technique designed to create the appearance of stability. The chances of successful creation of a complex system will be maximum if it is implemented in a series of small steps and if each step contains a clearly defined success, as well as the possibility of "rollback" to the previous successful stage in case of failure. Before putting into action all the resources intended for the creation of the system, the developer has the opportunity to receive feedback from the real world and correct possible errors in the project».

Among the main advantages of the model of "short cycles" can be distinguished:

- reduction of product's time to market;
- reduction of total costs;
- high speed of product development generates disruptive innovations (Christensen, 1997);
- increase the speed of execution of a specific order;
- improving the quality of finished products;
- meeting customers' expectations;
- minimize market risks.

So, the model of "short cycles" is a key feature of agile manufacturing, which is a concept that is particularly effective for industrial enterprises in the realities of the Industry 4.0 formation.

A pilot study conducted at PJSC Severstal and accompanied by interviews to some officials was the effective research method developed to achieve the objective of the paper.

The limitations of the study are not for production of standard products, but for performing a high-tech products that are produced in small batches or single copies. Russian reality is an important feature of this paper too.

4. Results and discussion

According to a study of industrial enterprises in Russia, which has been conducted from 2014 to the present (about 100 enterprises) (Gromova, 2019; Rudskaya and Rodionov, 2017, 2018; Glukhov et al, 2016; Rodionov et al, 2018; Kalinina and Valebnikova, 2018; Nikolova et al, 2017; Pupentsova and Livintsova, 2018) Russian Federation Government has embarked on import substitution and structural economic changes, which implies the actualization of the issues of increasing the competitiveness of national industry. In this regard, it is worth noting the need to implement effective models for managing industrial enterprises and organizing internal processes. Agile manufacturing (Gunasekaran, 1998; Larman, 2004) is one of such models. It is able to solve the most urgent modern problems, which consist of uncertainty and rapid changes in business environment.

PJSC Severstal (2020) is one of the brightest competitive examples on the world stage of following effective modern concepts of production organization in Russia. It is well-known steel and mining company in the world. In 2017, the company launched a major innovation program aimed at ensuring business growth without a significant increase in production volume. This program includes creation of innovative products. Since 2018 Severstal has moved from local projects to large-scale agile transformation. The model of "short cycles" implementation in PJSC Severstal attracts great scientific and applied interest. Data collection was carried out by studying the company's annual reports, analyzing interviews with top officials of the company (past and current Director of business system development of PJSC Severstal, managers of the center for business system development of PJSC Severstal, masters of production sites), a detailed study of the company's visual materials (videos, presentations, notes, Youtube channel materials, etc.), familiarization with materials that were presented at various scientific and practical conferences, visiting the official website of the company and specialized sites of this industry.

The pilot project aim was to develop a new type of product. Namely, the development of a new, more durable plastic packaging tape for the production of flat products. The plan was to release a new product not only for internal customers, but also for external ones. One packing tape was used in almost every redistribution of metallurgical production. According to Konakov, the foreman of the site of the cutting units of the metal finishing department No. 2 of the Cherepovets Metallurgical Plant, in his workshop the packing tape is used for packing sheets, as well as for packing rolls. Therefore, new tape should have high strength, withstand heavy loads, as well as high ductility so that it is not torn during transportation.

The cross-functional team consists of employees of the directorate for sales, marketing, technical quality development, customer support services. Business System Development Center is a team leader. Such team has a single criterion of success that is to bring the finished product to the client, satisfy the customer, and make a profit for the company. In their work, experts used a whole range of tools: scrum-meeting, retrospective, sprint planning. These tools allow to solve problems independently, promptly and efficiently. Thanks to the cross-functional team building, the experts at the beginning selected the optimal chemical composition, which should satisfy the customers' requirements for the packing tape. Next new product was tested. After that, the customer and the cross-functional team reached a final agreement, and they were engaged in the release of a new cold-rolled tape for flat-rolled products. There were 28 short cycles (the duration of each cycle is 2 weeks) for obtaining the final result. Schematically, the implementation of the model of "short cycles" is reflected in figure 2.

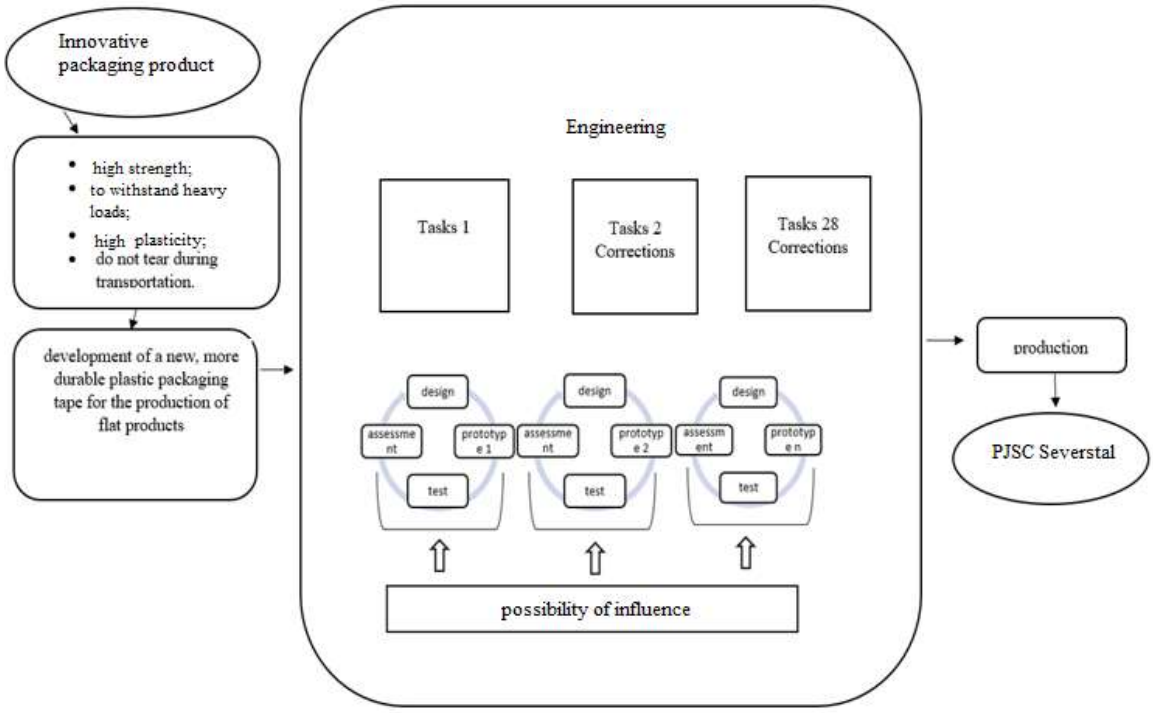

Figure 1: Implementation of the model of "short cycles" in the PJSC Severstal (Source, Own work)

This figure describes the logic of the organization of production with a focus on the tools used. At the beginning, the product that needs to be produced is contracted. The following are descriptions of the requirements of the external environment, which are decomposed to the basic characteristics of this product. The central part of the figure is the introduction of the model of "short cycles".

At the end, the increase in efficiency was clear: the product creation period was 9 months, instead of 2-3 years, obtained using traditional methods, that is, acceleration of product launch to the market increased by 3 times. The product was distinguished by unique properties that gave reason to recognize this product as innovative. Another value is the increased demand among consumers. According to Smirnov, manager of the Severstal business system development center, the speed is achieved through tools such as a retrospective, which turned out that further actions did not work. Director of Business System Development "Severgrupp" Kolobov argues that the use of the model of «short cycles» helps in conditions of "very large uncertainties." He emphasizes

constant contact with the client as an integral part of successful activity. A pilot project was recognized as a success in the company.

Severstal holds the position that taking the initiative and regularly interacting with customers is the key to constantly meeting changing needs. This interaction should help the company better understand the balance between price and non-price factors that influence customer decision - making. Severstal plans to simplify and develop interaction with customers at all stages from order processing to product delivery and after-sales service.

So, attention to end customers, new ways to improve efficiency and optimize production, along with Severstal's innovative approach and digital transformation, play a crucial role.

5. Conclusions

According to the results of the study, the following conclusions can be drawn:

- 1. With the beginning of the Industry 4.0 business environment is characterized by changes that occur at the highest speed and on a huge scale, as well as described by the systemic nature of the consequences. In the new realities in competition, not the one who is larger or has a long and successful development history wins, but the one who brings the new product to the market faster and retains the customer. Organization of production in today's reality has an important characteristic, reflecting the concentration at the stage of product development;
- 2. The model of "short cycles" is an incremental-iterative model of product development. This model reduces the time to develop new products from several years to several months. Also, this concept of product development contributes to the genesis of innovative products due to the achieved high speed;
- 3. Employees from the different production process stages should be brought together in dynamic teams formed around clearly defined market opportunities so that they can use each other's knowledge. It is supported by the direct participation of the customer. Through this process, knowledge is transformed into new products and services;
- 4. The implementation of the model of "short cycles" in the PJSC Severstal was accepted successful. It is clear that it will not be possible to bring a partially finished new product to the market in two weeks and then finish it. But it is real to reduce the path leading to the emergence of a new innovative product. And every two weeks, it is possible to adjust the direction of its improvement. This model can be considered promising for enterprises of the industrial sector of the Russian economy.

A possible continuation of this study consists in the presentation of the model of «short cycles» in the context of companies' collaboration.

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Curriculum Alignment: The Perspectives of University Students on the Impact of Industry 4.0 on Entrepreneurship Education Within Higher Education

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Abstract: Perceptions of curriculum misalignment on entrepreneurship education pose a threat, particularly with the advancement of Industry 4.0. Industry 4.0 has disrupted the traditional higher education institutions and their operating models, while entrepreneurship is believed to be the key to unlocking opportunities brought about by this revolution. As knowledge institutions that are sensitive and responsive to the interests and needs of society, higher education institutions are expected to continually restructure to accommodate the needs of a progressively technological economy. The research aim of this study was to investigate the impact of Industry 4.0 on entrepreneurship education in higher education institutions, and how undergraduate students perceive actions taken by the institution to produce graduates who are eligible participants in the new world of work characterised by constant innovation and complexity. The study develop the conceptual framework from the literature, comprising curriculum alignment, entrepreneurship education, higher education institutions, and student perspectives in order to understand the impact of Industry 4.0 on higher education, and how these aspects can be improved to better equip learners. The study was quantitative in nature. Two hundred and forty-eight questionnaires were administered to undergraduate Commerce students in their final year, and the data were analysed using descriptive and inferential statistics. In the findings, students affirmed that they had acquired some skills from the courses they had undertaken. However, the students also indicated that these skills were not enough to propel them to thrive in Industry 4.0, thereby inferring curriculum misalignment. It is recommended that a review of the current education system integrates Industry 4.0, which will assist in reskilling students and incorporating versatile courses that will enable students to take advantage of the benefits of Industry 4.0.

Keywords: entrepreneurship education, higher education institutions, Industry 4.0, curriculum alignment, entrepreneurship, higher education

1. Introduction

Curriculum alignment is one of the responsive actions adopted by Higher Education in response to the changing needs and interests of society and the entire global arena. Higher Education Institutions (HEIs) are faced with the task of providing educational programmes that equip students to meet the demands of Industry 4.0. This aligns with the argument of Van der Westhuizen and Nhleko (2021), who emphasise that leadership in HEIs also involves ensuring that the quality of education is enhanced and meets the demands of the future world of work, more especifically so following the era of Covid-19. Entrepreneurship Education (EE) is regarded as the foundation for entrepreneurial skills development and translates into effective performance in the various business ventures in which people engage. The objective of EE in HEIs is to expose learners to the entrepreneurial ethos, to produce students who are intellectual entrepreneurs and agents exposed to a variety of ventures that can generate job opportunities (Panwar Seth, 2020). The fourth wave of industrialisation (Industry 4.0) is regarded as an industrial revolution that will cause disruption in most industries throughout the world (Schwab, 2016). Four years subsequent to the argument produced by Schwab, the field of entrepreneurship has proven not to be exempt from this disruption. Industry 4.0 will need specific competencies that will push students to acquire competitive skills to thrive entrepreneurially within a digitalised context as new job creation opportunities arise. Xing and Marwala (2018: 1) state that "[h]higher education in the fourth industrial revolution (HE 4.0) is a complex, dialectical and exciting opportunity which can potentially transform society for the better". Consequently, EE must be aligned to the demands of Industry 4.0.

In this research study, the researchers aimed to gain an understanding of the impact that Industry 4.0 has on EE, and examined the actions that are being taken to equip students with the entrepreneurial skills they need to meet the demands of Industry 4.0. HEIs are in the best position to nurture individuals as agents who will contribute to the transformation of society. To address the aims of this research study, data were collected from students attending the School of Management, Information Technology and Governance at the University of

KwaZulu Natal (UKZN), Westville Campus. The study then analyzed the data on how Industry 4.0 impacts EE, and how students are entrepreneurially equipped with the skills required by Industry 4.0.

2. Research problem

Bux (2019) argues it is crucial that curriculum alignment be constructive to inform course design and redesign that will be effective and make entrepreneurship education practical. One of the challenges facing higher education is curriculum misalignment, particularly within the entrepreneurship curriculum. The South African government is attempting to ensure that the education system supports the demands of Industry 4.0. Nevertheless, EE in South Africa – as a developing country – is still prone to barriers that are imbedded in what Chimucheka (2013) regards as programmes that are not based on skills development. In his opinion, the availability of the appropriate infrastructure to deliver quality EE is poor. Industry 4.0 will bring challenges to and opportunities for the labour market (Schwab, 2017). The challenge lies in the actions taken by government to ensure that South African HEIs produce social transformation agents with entrepreneurial competencies that will enable them to thrive – and not merely survive – in a world that is changing and uncertain. Gravett (2019) quotes the former South African Minister of Higher Education and Training, Dr Naledi Pandor, who stated that the curriculum ought to take a competence-based approach, which will integrate the skills demanded by Industry 4.0. A reassessment of the current EE and its alignment to Industry 4.0 is required.

3. Research aim and question

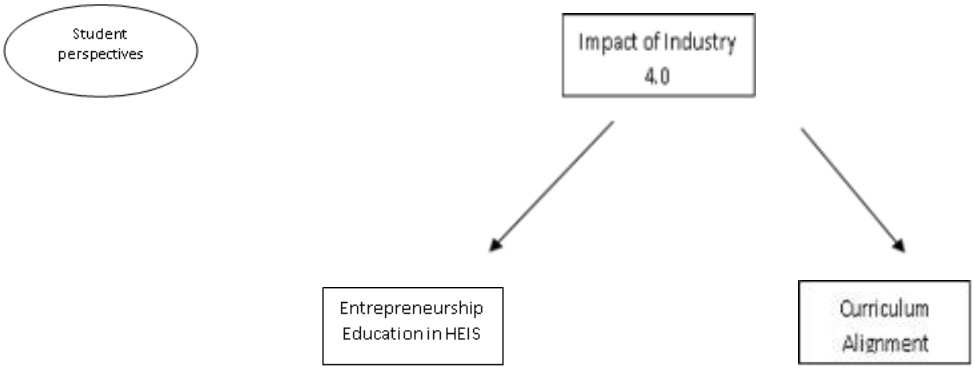
3.1 Research aim

The aim of this research study was to investigate the impact of Industry 4.0 on the curriculum alignment of EE within higher education through the perspectives of students. A South African public university was used as a case presentation of an HEI, and this is also noted as a limitation to the research.

3.2 Research question

What are the perceptions of exit-level undergraduate students on the curriculum alignment of EE to the demands of Industry 4.0 within HEIs?

4. Conceptual framework



4.1 Curriculum alignment and Industry 4.0

Curriculum alignment was the variable of the conceptual framework that was assessed in the university. Wijngaards-de Meij and Merx (2018) define curriculum alignment as the process in which state and educational advisors formally evaluate an educational programme in order to address and align the altering needs of students and the evolving needs of the workforce. The authors further state that "teachers, educational advisers and program coordinators collaborate to develop the curriculum and ensure there are no gaps that may impede academic progress" (Wijngaards-de Meij & Merx, 2018: 3).

In his 2020 State of the Nation Address (SONA), the President of South Africa, Cyril Ramaphosa, announced the establishment of a new University of Science and Innovation in Ekurhuleni to train young people in high-impact and cutting-edge technological innovation in an attempt to future-proof the country's economy by producing a workforce that possesses the adequate skillset. BusinessTech (2019) quotes the Minister of Basic Education, Angie Motshekga, as saying that the Department of Basic Education (DBE) had trained 43 774 teachers in computer skills, and would shortly begin training teachers for the new coding curricula. This includes a robotics curriculum that will be introduced from Grade R to Grade 9. The Minister further stated that –

> *[t]his will not only develop Science, Technology, Engineering and Mathematics (STEM) skills, but will also contribute to effectively developing children's creativity, critical thinking, design thinking, and digital skills. This will ensure that South Africa develops learners who are makers and inventors who will contribute to building an innovative culture in South Africa. This signifies that South Africa is making attempts to produce learners who will be able to become effective participants in Industry 4.0 and build the South African economy.*

Within higher education, however, the process may be more challenging than merely rolling out a plan to introduce technology-based modules. The previous minister of the DHET, Dr Naledi Pandor, stated that currently only eleven of the twenty-six public universities are offering Industry 4.0-related courses. If the country aims to take full advantage of the opportunities brought about by Industry 4.0, all HEIs should have Industry 4.0-related modules and courses (Mzekandaba, 2019a). This emphasises the need for HEIs to embrace new ways of teaching and leading Industry 4.0. According to Xala (2019), the Minister of the DHET appointed a task team encompassing various sectors that will strictly deal with Industry 4.0 and the opportunities and challenges it poses for higher education. Consequently, there is a need for the higher education curriculum to be aligned to the demands of Industry 4.0 in order to be able to fully function and be effective in the era of digital transformation, and innovatively grow the economy of South Africa.

According to Manivannan and Suseendran (2017: 106), -

> *[t]he curriculum for individual courses has been designed {to include} a perfect blend of inputs from renowned academicians and industry experts from each university… to make every graduating student academically excellent and professionally groomed to assume leadership roles in every sector of the industry and economy.*

Industry 4.0 calls for the 'perfect blend' of the various aspects that would make students fit participants in industry. At the 2019 Entrepreneurship Development in Higher Education (EDHE) Lekgotla, the Deputy Vice-Chancellor: Research at UKZN who chaired the session titled 'Case Studies of University Entrepreneurship', stated that "An entrepreneurial mind-set in our nation has got to start at our institutions." The professor argued that entrepreneurship is solving problems, but there was no place for it in bureaucratic institutions, and universities needed to inject some agility to enable reasonably quick decision making to make things happen. He argued further that the current state of the curriculum merely boasts about preparing students for the world of work. However, this questions the relevance of the current education curriculum and training, as students may be receiving irrelevant skills and training for professions that may no longer exist a few years down the line.

The same emphasis ought to be applied to the creation of a curriculum that incorporates entrepreneurial elements in all other academic disciplines. Using hashtags such as *#entrevolution*, the 2019 EDHE Lekgotla called for the development of student entrepreneurs in universities and the transformation of the curriculum as HEIs embark on creating "fully entrepreneurial universities". For EE to thrive within universities, it is therefore imperative that an accommodative environment be created, be it through integrating entrepreneurship into the curriculum or by creating opportunities to promote entrepreneurship on campus. The integration of EE in the different academic fields would call for ensuring that EE is relevant to Industry 4.0. The literature in this study indicates that Industry 4.0 poses opportunities for African industrialisation. Naudé (2017: 01) lists some of these opportunities as "new business models for developing and bringing products and services to consumers". Accordingly, EE ought to be integrated into Industry 4.0, so that these opportunities may bear fruit.

4.2 Entrepreneurship education in the South African context

South Africa is a country characterised by a high unemployment rate, low entrepreneurial activity, and a high rate of failure of small businesses. Entrepreneurship is perceived as a solution to overcoming these challenges (Amadi-Echendu, Phillips, Chodokufa & Visser, 2016; Van der Westhuizen, 2019). Most South Africans have

grown up with little involvement or exposure to entrepreneurship or business innovation, and this may be why they view themselves as lacking the potential to become active in this regard (Mary & Mitchel, 2006). This is one of the challenges facing the establishment of an entrepreneurial class in South Africa. Different authors argue that EE is the tool to instil the entrepreneurial spirit in students (Van Praag & Versloot, 2007; Radipere, 2012; Ghina, Simatupang and Gustomo, 2017; Kanonuhwa, Rungani, and Chimucheka, 2018). Nyamunda and Van der Westhuizen (2018) further argue that to combat the ever-increasing unemployment rate, a transformative learning theory approach to entrepreneurial learning and the curriculum must be taken. As a result of these challenges, various entrepreneurship courses have since been offered in South African HEIs including UKZN, University of Johannesburg, MANCOSA, University of Pretoria, University of the Witwatersrand and Stellenbosch University (Masters Portal, 2019).

According to their websites, the nature of entrepreneurship training offered in these institutions varies from undergraduate degrees and postgraduate degrees to modules for certain courses and programmes offered to encourage entrepreneurship. For instance, MANCOSA and the University of Pretoria offer a Bachelor of Commerce in Entrepreneurship, while UKZN offers entrepreneurship as a module for Management majors at undergraduate level and a full entrepreneurship course at postgraduate level. University of the Witwatersrand offers Entrepreneurship and New Venture Creation at Masters level. The undergraduate qualification at MANCOSA is exemplary, with modules ranged from Business Management, Business Communication and Management Computing to Statistical Techniques in Business, thereby ensuring that the students acquire the basic skills to thrive in Industry 4.0. Gumede (2019), however, cited in Coetzee, Neneh, Stemmet, Lamprecht, Motsitsi and Sereeco (2021:02), argues for the need for entrepreneurship courses to become "increasingly dynamic and adaptable, simultaneous to the demand for new skills dictated by the 4IR" so as to produce qualified graduates. Coetzee et al. (2021) further argue that given that the STEM disciplines are guaranteed to dominate the content related to Industry 4.0, this is particularly concerning for South African universities because as noted by Pandor (2019) above, only eleven of twenty-six universities have introduced modules and courses that are responding to the demands of the Industry 4.0 skills. The same is evident in other developing countries in Africa such as the Democratic Republic of Congo (Ruba, van der Westhuizen, and Chiloane-Tsoka, 2021)

The National University Entrepreneurship Ecosystem Baseline Report by EDHE (2020) indicates that in their study of twenty-six South African universities, all of these universities indicated some level of entrepreneurial activity ranging from full courses, ten-week open online courses, entrepreneurship modules, incubation hubs, and business schools, amongst other initiatives. The findings of the study showed that there was visible progress in these entrepreneurial activities at the majority of institutions. The development varied, however, with some universities having more influence on the process and others contributing less. The study further indicated that, overall, universities place less emphasis on entrepreneurship as a degree at undergraduate level compared to the postgraduate level. Entrepreneurship at undergraduate level is provided only as a module or integrated in some way. Nevertheless, the offering of entrepreneurship courses at both undergraduate and postgraduate levels does show a level of progression and engagement with entrepreneurship at South African universities.

Chimucheka (2014) states that the increase in HEIs offering these courses is due to the increased demand for such courses over time. The author is of the opinion that HEIs can help create more entrepreneurial mentality among the youth by teaching opportunity-seeking and identifying skills, understanding rewards and risks, as well as the running of enterprises. The increase of EE is perceived to contribute immensely to job creation and economic growth (Van der Westhuizen, 2019c). However, a contrast exists between the increasing EE programmes and the ever-rising unemployment levels among the youth of South Africa, including graduate unemployment.

4.3 The role of higher education in leading Industry 4.0

According to the Government Gazette (2020: 07), "HEIs have an important role to play in both identifying the key skills and occupations which will support interventions to grow the economy, and in improving the responsiveness of the Post-School Education and Training (PSET) system to the skills needs of the labour market."

Baijnath, cited in Dell (2018), states that the current model used to produce higher education students has remained the same over a lengthy period and has produced generations of students, but that this model does

not reverberate with Industry 4.0. The author further argues that the virtually 200 000 graduates who are produced annually ought to be equipped to enter into society and the business sphere, and become citizens who are productive and contribute to the improvement of all. Industry 4.0 needs us to creatively think about the processes of manufacturing, value chain and the various processes of customer service (Mezied, 2016). On the other hand, argues Mezied, the future of education "emphasizes the immense need to look beyond these areas and strategically utilize the 'Internet of Things' to prepare the coming workforce for the challenges ahead". Mkhwanazi and Mbohwa (2018: 324) make the argument that "the 4th Industrial Revolution opportunities look different and are driven by technological advancement. Entrepreneurship programmes are not designed to teach about technology and industrial activity but the generic principles of envisioning solutions". This then highlights the need for the design of the teaching and learning curriculum of the subject of entrepreneurship to be designed in a manner that will enlighten students about the complex socio-technological transformation issues (Van der Westhuizen and Goyayi, 2021). In support, Mkhwanazi and Mbohwa (2018, 324) further argue that for the EE curriculum to be aligned to Industry 4.0 education demands,

> *… Student-recipients of entrepreneurship education will need to be rigorously taught about techno-economic opportunities to be able to develop competitive business ideas… In addition to the acceptable set of entrepreneurial traits there shall be a consideration of a new entrepreneurial trait referred to as "Technical ability". This kind of a trait would address the knowledge of general use of technical resources in the entrepreneurship arena from computers to production technology awareness.*

Nevertheless, the role of HEIs is emphasised in influencing future technology by becoming the proving ground for different innovations and passing on education from one generation to the next (Van der Westhuizen and Goyayi, 2020). Mezied (2016) states that traditional education has undoubtedly contributed immensely to the levels of industrial revolution that we have as a society today, and to the continuous advancements in technology. Still, in order for the right skillset and knowledge to be passed to the current and future generations that will encompass the future workforce, it is important to raise the question of how HEIs will be impacted by Industry 4.0 and how the delivery of higher education will be affected and altered to meet the demands of this industry. Dell (2018) emphasises the importance of the Universities of Technology and their potential role in leading Industry 4.0 by stating that "as knowledge multipliers, universities of technology could focus on bringing knowledge and actors together to exchange ideas and spread knowledge through the use of technology platforms." The author further argues that institutions that offer entrepreneurship programmes through teaching and learning can also invest resources in building an ecosystem that supports students' entrepreneurial intention by providing links to industry and incubators.

5. Research methodology

5.1 Sample

The target population for this research study was students enrolled as exit-level undergraduate students in the School of Management, Information Technology and Governance (SMIG). The undergraduate programmes offered by the SMIG include a Bachelor of Commerce – General, which allows for specialisation in Accounting, Economics, Finance, Human Resources Management, Information Systems, Management, Marketing, Supply Chain Management and Public Management; a Bachelor of Business Administration; a Bachelor of Administration (Human Resource Management); and a Bachelor of Administration. This population was selected as the students were on the brink of completing their qualifications and entering the labour market. The population was appropriate in determining whether the curriculum had been developed in a manner that produced participants fit for Industry 4.0. The population of the study was 657 and the sample size was 248. The Taro Yamani formula was used to determine the sample size of this research study.

$$\boldsymbol{n = \frac{N}{1 + N * (e)2}}$$

Source: Israel, 2013

Where:
n = sample size
N = the population size
e = the level of precision/confidence interval of 0.05

$$n = \frac{657}{1 + 657 * (0.05)2}$$

In this research study, a sample size of **248** was therefore selected from the SMIG on the Westville Campus.

5.2 Pilot testing

The questionnaire that was developed using the literature in the study was piloted, using simple random sampling, to a group similar to the target population of this study. Various researchers suggest different sample sizes for a pilot study to be conducted. Johanson and Brooks (2010) cite van Belle (2002: 11), suggesting that researchers "use at least twelve observations in constructing a confidence interval". Chaudhary and Israel (2014) argue that there is no prescribed sample size for a field test, since different authors suggest different sample sizes ranging from 10-25 (Sheatsley, 1983) to 20-50 (Sudman, 1983). The authors argue further that researchers opt for different sample sizes depending on factors such as budget and time.

In this research study, twelve students were asked to complete the questionnaire to check whether they understood the questions clearly. This number of students was decided according to what Julious (2005) recommends to be the thumb rule for conducting pilot studies, justified on the rationale on feasibility and precision about the mean and variance. Three students were randomly selected from each of the four disciplines; Human Resource Management, Information Systems and Technology, Marketing, and Supply Chain and Management .These respondents were not included in the major study. The results of the pilot study were valid and reliable, and on this basis no changes were made to the adopted questionnaire for the major study. The questionnaire was accompanied by a consent form, explaining the purpose in depth and assuring the respondents' anonymity and confidentiality, as well as their voluntary participation. The respondents could also choose not to participate or withdraw at any time.

5.3 Data collection

For this research study, data were collected using a structured questionnaire consisting of only closed-ended questions. The structured questionnaire was formulated with the assistance of a statistician, with the questions focusing on the objective of the research study. The questionnaire measured the alignment of the curriculum with Industry 4.0. The demographic section of the questionnaire required students to indicate their gender, race, discipline and age group. Ahmed and Ilyas (2017) defines questionnaires as a set of questions that is pre-formulated by a researcher concerning particular questions that respondents answer. The author further argues that questionnaires become the vehicle that can be used by researchers to pose the direct questions that they want the respondents to answer in relation to the research objectives. As this research study was confined to the Westville Campus, it was a good option for the researchers to use personally administered questionnaires. The main advantage was that the researchers could administer and collect all the questionnaires within a short period of time, ensuring a 100% response rate. Moreover, any concerns that the respondents had concerning the questions could be immediately clarified by the researcher. By personally disseminating the questionnaires, the researchers were granted the opportunity to thoroughly explain the topic and encourage the respondents to give honest answers. However, Sekaran and Bougie (2016) also argue that the main disadvantage of these questionnaires is that explanations pose the possibility of introducing a bias, and that that they take more time and effort compared to electronic questionnaires.

6. Findings

Tables 1 and 2 present an overview of the one-sample statistics and one sample t-test performed on the variables. The one sample t-test was used to test if the average agreement score was significantly different from the central score of 3.5 as the test value (halfway between 1 and 6 – the Likert scale used). The results were interpreted as agreement if the results were significant and having a mean score > 3. Moreover, the results were interpreted as disagreement if the results were significant and the mean score was < 3. The following results of the first objective indicated significance and scored means of >3, which inferred agreement. There was significant agreement that the courses taught the respondents: to be critical thinkers, M = 4.93, t (247) = 22.973, p < .0005; to communicate effectively, M = 4.80, t (247) = 21.287, p < .0005; to collaborate with others, M = 5.02, t (247) = 29.859, p < .0005; to think creatively, M = 4.80, t (247) = 23.184, p < .0005; to be adaptable to different situations, M = 4.65, t (247) = 16.235, p < .0005; to educate themselves using electronic means, M = 5.06, t (247) = 30.921, p < .0005; to take lead/initiative, M = 4.65, t (247) = 17.833, p < .0005; to use available infrastructure,

M = 4.98, t (247) = 34.407, p < .0005; relevant skills, M = 4.32, t (247) = 12.520, p < .0005, to analyse situations and information, M = 4.85, t (247) = 33.989, p < .0005; and to solve problems, M = 4.60, t (247) = 20.654, p < .0005.

The following results of the research question revealed neither a significant agreement, nor a significant disagreement: having enough knowledge and skills, M = 3.54, t (247) = .374, p < .0005; and analysing numerical data, M = 3.45, t (247) = .539. Concerning the curriculum alignment aspect, it was found that all the items indicated a significant agreement, except for having enough knowledge and skills, M = 3.54, t (247) = .374, p < .0005 and analysing numerical data, M = 3.45, t (247) = -.539, as shown in Tables 1 and 2.

Table 1: One-Sample statistics

	N	Mean	Std. Deviation	Std. Error Mean
1.1 ...to be a critical thinker	248	4.93	.981	.062
1.2 ... to communicate effectively	248	4.80	.964	.061
1.3 ... to collaborate with others on projects	248	5.02	.800	.051
1.4 ... to think creatively when working on a project	248	4.80	.885	.056
1.5 ... to be adaptable to different/ changing situations	248	4.65	1.111	.071
1.6 ...to educate myself using electronic means and on-line media	248	5.06	.793	.050
1.7 ...to take the lead/initiative and not always be a follower	248	4.65	1.018	.065
1.8 ...to use available infrastructure to find out what I need to know	248	4.98	.679	.043
1.9 ...enough knowledge and skills to be ready for the working world of Industry 4.0	248	3.54	1.527	.097
1.1 ...relevant skills to equip me for Industry 4.0	248	4.32	1.030	.065
1.11 ... to analyse situations and information	248	4.85	.624	.040
1.12 ... to solve problems in an innovative way	248	4.60	.842	.053
1.13 ... to analyse numerical data	248	3.45	1.413	.090

Below are the results of the one sample t-test for curriculum alignment.

Table 2: One sample t-test output for curriculum alignment

	Test Value = 3.5					
					95% Confidence Interval of the Difference	
	T	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
1.1 ...to be a critical thinker	22.973	247	.000	1.431	1.31	1.55
1.2 ... to communicate effectively	21.287	247	.000	1.302	1.18	1.42
1.3 ... to collaborate with others on projects	29.859	247	.000	1.516	1.42	1.62
1.4 ... to think creatively when working on a project	23.184	247	.000	1.302	1.19	1.41
1.5 ... to be adaptable to different/ changing situations	16.235	247	.000	1.145	1.01	1.28
1.6 ...to educate myself using electronic means and on-line media	30.921	247	.000	1.556	1.46	1.66
1.7 ...to take the lead/initiative and not always be a follower	17.833	247	.000	1.153	1.03	1.28

1.8 ...to use available infrastructure to find out what I need to know	34.407	247	.000	1.484	1.40	1.57
1.9 ...enough knowledge and skills to be ready for the working world of Industry 4.0	.374	247	.708	.036	-.15	.23
1.1 ...relevant skills to equip me for Industry 4.0	12.520	247	.000	.819	.69	.95
1.11 ... to analyse situations and information	33.989	247	.000	1.347	1.27	1.42
1.12 ... to solve problems in an innovative way	20.654	247	.000	1.105	1.00	1.21
1.13 ... to analyse numerical data	-.539	247	.590	-.048	-.23	.13

7. Discussion of findings

Objective: To assess the perceptions of exit-level undergraduate students on whether *curriculum alignment* in EE in an HEI is aligned to the world of work requirements of Industry 4.0

The purpose of this objective was to ascertain whether the current entrepreneurship curriculum is able to equip students to meet the adequate skillset demanded to be successful in the entrepreneurial world and labour market of Industry 4.0. These findings assisted the researchers to know whether the institution offers EE courses that will ensure that students are competent for the future world of work. Ra, Shrestha, Khatiwada, Yoon and Kwon (2019: 26) argue that the "current education systems are ill equipped to meet changing skill needs." The literature used in this study argues for the development of an adequate curriculum that will prepare students for Industry 4.0. The former Minister of the DHET, Dr Naledi Pandor, further emphasised the need for employees to future-proof their careers by having different skills in areas such as the Internet of Things and Artificial Intelligence. Hence, the need for South African HEIs to embrace new teaching methods and courses (Mzekandaba, 2019).

The findings indicate that the EE provided in this university has developed the students' entrepreneurial skills to be ready to venture into entrepreneurship and the future world of work. However, the findings in this study further infer that the students perceive that the curriculum had not enabled them to receive enough training on the knowledge and skills for Industry 4.0, or in heightening the skill of analysing numerical data. The findings revealed that, while the courses offered in the institution have enabled students to obtain useful skills to some extent, the students are of the view that there is still a need for these courses to be modified, to focus more on key skills of Industry 4.0 such as data analytics, and to incorporate new technology enabling digital innovation within entrepreneurship education.

The objective was achieved with the results that were obtained from the respondents.

8. Conclusion

This paper shows that Industry 4.0 will impact entrepreneurship education, and raises a sense of urgency for HEIs to align the entrepreneurship curriculum to the demands of Industry 4.0 in order to produce equipped graduates. The findings indicate that the students are of the view that they have not received enough knowledge and skills to be ready for the working world of Industry 4.0, inferring curriculum misalignment. This was supported by the findings that the students are not confident in their ability to use web development tools, analyse data and use commercial software, as well as creating digital innovation. These findings can assist the institution in improving the development of these skills in the EE courses offered. After a thorough analysis of the responses to the data that were collected using descriptive and inferential statistics, the researchers could conclude that the research aim of this study was achieved.

Although this research study used acceptable and adequate quantitative methods, there were limitations. The data collection method was limited to that of questionnaires. The inclusion of another research instrument, such as face-to-face interviews, could have given the researcher the advantage of picking up non-verbal cues from the respondent[s], such as any discomfort and other body language unconsciously exhibited. This infers that the researcher could have obtained more information from the respondents and made changes to the questions as deemed necessary in order to obtain more information. Moreover, the data collection commenced during the examination period, which lengthened the collection process and reduced easy access to the target population.

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Influence of Entrepreneurship Learning Modes on Entrepreneurial Intentions of Science Based Students

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Abstract: While entrepreneurship education has been extensively discussed in related academic literature, scholarly works on the modes through which entrepreneurship education is learnt seems to be missing in literature. The present paper thus explores the three modes of learning (formal, non-formal and informal) with the understanding that the three modes are all viable sources of acquiring entrepreneurship education. The study draws insight from established theories in literature such as the theory of planned behaviour, theory of reasoned action, theories of motivation. The study relied upon the design and administration of a questionnaire that was developed from relevant literature and theories. The data obtained from a total of 150 accurately completed questionnaires was used in the analysis. The study thus puts forward that non-formal entrepreneurship education, which sits somewhere in-between the two extremes (formal and informal learning), was the best approach for building an interest in entrepreneurship amongst STEM students who are naturally deprived of this mode of education. The study endorses the uniqueness of non-formal education because of its adaptability to each student's stage of development or learning. Non-formal entrepreneurship education was found to be versatile, participative and inclusive, based upon the needs of the students.

Keywords: entrepreneurial intentions, entrepreneurship, formal entrepreneurship education, informal entrepreneurship education, non-formal entrepreneurship education

1. Introduction

While issues relating to entrepreneurial education and training have been extensively discussed in academic literature (Lans, Gulikers & Batterink, 2010; Bae, Qian, Miao & Fiet, 2014; Küttim, Kallaste, Venesaar, & Kiis, 2014; Chen, Hsiao, Chang, Chou, Chen & Shen, 2015; Murugesan & Jayavelu, 2015; Karimi, Biemans, Lans, Chizari & Mulder, 2016; Kakouris, 2017; Nabi, Walmsley, Liñán, Akhtar & Neame, 2018; Fleck et al., 2020), scholarly works on the learning modes through which entrepreneurship education is acquired seem to be missing in research related literature. Only very few previous studies (Zhang & Hamilton, 2010; Walter & Dohse, 2012; Leitch, Hazlett & Pittaway, 2012; O'Brien & Hamburg, 2019) have touched on one or two of these learning modes. The impression presented in most previous works is that the mode of acquiring entrepreneurship education is through formal learning via formal institutions which culminates in students receiving a degree or certificate affirming their acquisition of new knowledge (Lans *et al*., 2010; Küttim *et al*., 2014; Chen *et al*., 2015; Karimi *et al.*, 2016; Nabi, *et al*., 2018). Indeed, formal learning occurs in a structured and organized environment such as found in training/education institutions or 'on-the-job'. It is designed explicitly as education in terms of time, objectives and resources. While formal learning is a very valid source of acquiring entrepreneurial knowledge, it is not the only source of this form of education. Some recent studies are stressing the importance of non-formal and informal modes and channels of entrepreneurship education (Păduraru, 2013; Romantsev, Zelenov, Kryuchkov, Efanov & Bychkova, 2017; Latchem, 2018; Jegede, 2020a, 2020b, 2020c). Non-formal learning includes various structured learning situations which do not have the level of curricula, syllabi, accreditation and certification associated with formal learning (Cha & So, 2020), but have more structure than informal learning, which typically takes place spontaneously as part of other activities (Encinar-Prat & Sallán, 2019; Cha & So, 2020; Shirvan, 2020). Non-formal learning involves experiential learning activities that foster the development of knowledge and skills (Nygren, Nissinen, Hämäläinen & De Wever, 2019; Jegede, 2020a, 2020b). There are practices that encourage young people to choose their own study programme and projects, an important factor because it offers the students the flexibility and freedom to explore their emerging interests. Yet another mechanism of learning is the informal mode in which knowledge creation results from daily activities related to work (Encinar-Prat & Sallán, 2019; Nygren *et al*., 2019; Jegede 2020a). This method is not structured and usually does not lead to certification (Jegede 2020b). Informal learning is a pervasive phenomenon of learning via participation or knowledge creation, in contrast with the traditional view of teacher-centered learning via knowledge acquisition (Clardy, 2018; Roberts *et al*., 2018; Jegede 2020c). Informal learning is

organized differently to formal and non-formal learning because it has no set objective in terms of learning outcomes and is always unintentional from the learner's standpoint.

The present paper thus explores the three modes of learning (formal, non-formal and informal) with the understanding that all are viable sources of acquiring entrepreneurship education. The formal learning mode data was captured by asking science, technology, engineering and/or medical (STEM) students if they were registered for, and studying, an entrepreneurship related module at the university. STEM students in general are not exposed to business, management and/or any entrepreneurship courses. Information on non-formal entrepreneurship learning was captured by asking if the STEM students had participated in an entrepreneurship workshop/seminar or short-term training course. While knowledge relating to non-formal entrepreneurship learning was captured by asking if the STEM students had been spontaneously exposed to entrepreneurship training either through association with a family-run business, living among small business owners or interacting closely with people inclined towards entrepreneurship.

2. Literature review (point of departure)

Some studies described in the reviewed literature have examined the interphase between entrepreneurship education and entrepreneurship intentions. For instance, Lans *et al.* (2010) investigated whether students have diverse entrepreneurial intentions and if they are based on various conventional backgrounds known to influence the advent of such objectives. The study was based on a quantitative exploration of 102 life-science students to discover if gender and entrepreneurial self-efficacy have a direct influence on entrepreneurial intentions. This research study was grounded on the belief that entrepreneurship education and training courses at universities mainly address entrepreneurial intentions and not entrepreneurial behaviour and that students, in contrast to active entrepreneurs, might have an extensive choice of entrepreneurial intentions when exposed to entrepreneurship education. Lans *et al.* (2010) found that gender and entrepreneurship education are associated with entrepreneurship interest. Their study, however, concluded that the way entrepreneurship education programmes are operationalized needs rethinking in order to have the maximum impact on stimulating students' entrepreneurial behaviour.

The study by Chen *et al.* (2015) sheds more light on the influence of entrepreneurship education among science-based students. Using a pre-test and post-test experimental design for one single subject group conducted for 18 weeks, these researchers sought to recognize if taking an entrepreneurship module can improve the course satisfaction, learning efficacy and entrepreneurial intentions of science or engineering-based students. Their results showed high satisfaction and better learning efficacy on the part of the students, but the entrepreneurship training did not have any significantly positive impact on the students' entrepreneurial intentions. The researchers thus concluded that entrepreneurship education does not necessarily stimulate students to 'pursue an entrepreneurial career,' but does increase their effectiveness and efficiency by the application of new knowledge in the workplace.

However, a similar study that conducted by Nabi *et al*. (2018) used a longitudinal survey of business students at a British university, based on four scenarios related to the participation/non-participation in entrepreneurship education, and subsequent increase/decrease of entrepreneurial intentions. Their findings suggest that the influence of entrepreneurship education is not a constant, and, while it showed a positive relationship in some cases, in others it led to a decrease in entrepreneurial intentions. The study by Karimi *et al*. (2016), an ex-ante and ex-post survey, from a sample of 205 participants of entrepreneurship education programmes at six Iranian universities is relevant to this research project. Results indicated that the elective entrepreneurship education programmes significantly increased students' entrepreneurial intention, although this increase was not substantial for the compulsory entrepreneurship education courses. In like manner, Walter & Dohse (2009)'s examination of how the extent of entrepreneurship education within university departments influences students' entrepreneurial intentions, showed that active modes of entrepreneurship education directly increase their entrepreneurial objectives and attitudes. The study by Küttim *et al.* (2014), based on a cross-sectional study with samples drawn from students from 17 European countries, also showed that participation in entrepreneurship education exerted a positive impact on their entrepreneurial intentions.

An interesting finding from the reviewed literature on entrepreneurship education/entrepreneurial intention, was a meta-analysis involving 73 studies with a total sample size of 37,285 individuals carried out by Bae *et al.* (2014). This research highlighted the importance of pre–education entrepreneurial intentions for arousing

entrepreneurial interest in students. Their study showed a significant correlation between entrepreneurship education and entrepreneurial intentions. However, after controlling for pre–education entrepreneurial intentions, the link between entrepreneurship education and post–education entrepreneurial intention was insignificant. A study by Piperopoulos & Dimov (2015) contextualizes the relationship between student's self-efficacy beliefs and entrepreneurial intentions in the content and pedagogy of the entrepreneurship course. The paper proposed that the nature of the entrepreneurship course − whether theoretically or practically oriented − creates a separate motivational structure for entrepreneurship. Based on a survey of 114 students enrolled in different entrepreneurship courses at a major British university, the results showed that greater self-efficacy is associated with lower entrepreneurial intentions in the theoretically oriented courses, while greater self-efficacy is associated with higher entrepreneurial intentions in the practically oriented courses.

What is common to all these abovementioned studies is that they were mostly carried out in developed countries, only very little work has been conducted in terms of the influence of entrepreneurship education on the stimulation of entrepreneurship interest of students in developing countries (see for instance the study by Karimi *et al*., 2016 on Iranian students). While some previous studies have examined science students (Lüthje & Franke, 2003; Souitaris et al., 2007; Murugesan & Jayavelu, 2015; Kakouris, 2016), statistics for Africa are missing in the reviewed literature. It might be erroneous, however, to extrapolate the pattern from developed countries and generalize them for all students. Also, most of the previously described studies included students from different disciplines. Our belief is that students from various disciplines will respond differently to entrepreneurship education and training. For example, science and engineering students are less likely to exhibit entrepreneurial tendencies than students from busines and management schools. Another limitation the authors have noted in the reviewed literature is the overly narrow view of the concept of entrepreneurship education. In our view, entrepreneurial education is not restricted to modules or courses in the tertiary institution as is indicated in literature from developed countries. Entrepreneurial education and training arise through perception which can result from different sources (institutional and non-institutional) through different channels (experiential or pedagogical) for different desired results (outcome oriented or without a set goal). As previously indicated, traditional learning occurs through three modes: formal, non-formal and informal (Grajcevci & Shala, 2016; Manolescu, Florea & Arustei, 2018; Nygren, *et al*., 2019; Cha, & So, 2020). It is our believe that entrepreneurship education likewise is taught through these three channels. The present study expands on previous studies by exploring the three modes through which entrepreneurship education take place.

3. Theoretical framework

Based on established theories highlighted in the reviewed literature, such as the theory of planned behaviour (Ajzen, 1991, 2020), theory of reasoned action (Madden, Ellen & Ajzen, 1992; Vallerand et al., 1992), theories of motivation: interest, attribution theory, expectancy-value theory and self-efficacy theory (Wigfield & Eccles, 2000; Eccles & Wigfield, 2002). These theories all emphasize that learners need to know, understand, and appreciate what they are experiencing to become motivated. Based on these theories, the present paper posits that between entrepreneurship intention and action, a whole range of factors come into play. Hence, not all entrepreneurial intentions will translate into action. Also based on the theories delineated above, entrepreneurship learning is vital in the build-up of students' entrepreneurship intentions. But while entrepreneurship learning is important, the mode through which the learning takes place is more significant. The present study thus hypothesizes that:

> *H_1: Entrepreneurship education is associated with entrepreneurial intentions amongst the STEM students:*
>
> *H_{11}: Formal learning is correlated with entrepreneurial intentions amongst the STEM students.*
>
> *H_{12}: Non-formal learning is correlated with entrepreneurial intentions amongst the STEM students.*
>
> *H_{13}: Informal learning is correlated with entrepreneurial intentions amongst the STEM students.*

4. Methodology

This study was carried out at a federal university in southwestern Nigeria. This survey relied on the design and administration of a questionnaire that was developed from relevant literature discussed in the literature review and theoretical framework sections. The main research instrument was specially premeditated to elicit information from students drawn from six faculties (Agriculture, Built Environment, Engineering, Medical Sciences, Pharmacy and Science) relevant to the study. The sampling technique involved the purposive selection

of the highest-ranking university in Nigeria in terms of research outputs (publications and patents), followed by the purposive selection of final year undergraduate students and postgraduates (Diploma, Master and PhD students). A total of 150 accurately completed questionnaires were used in the analysis. The completed questionnaires were coded and the data entered onto the spreadsheet. The coded data was analyzed in response to the study objectives. The study thus captures variables representing entrepreneurial intention and entrepreneurship learning modes. Cross tabulations and chi square tests were used to determine the association between the three different modes of learning and entrepreneurial intention. Cross tabulations are simply data tables that present the results from both the entire group of respondents as well from various sub-groups. Cross tabulation used these groups' variables to understand the correlation between the variables representing both entrepreneurship education and entrepreneurial intentions. It also showed how associations change from one variable grouping to another. The cross tabulations were also expected to reveal relationships that might not be readily apparent when analyzing the total survey responses using just frequencies. The Pearson chi-square test was conducted essentially to explain whether the results of the cross-tabulation exercise were statistically significant.

5. Results and discussion

The research shows that many STEM students have entrepreneurial interests (Table 1 below). An average of seven out of every ten students indicated either having intentions of protecting their inventions or commercialization of their research outputs or starting a business after graduation or from the research they are currently conducting. Research has shown that among university students with the highest entrepreneurial intentions, those with self-employed parents were twice as likely to start a new business (Lindquist, Sol & Van Praag, 2015; Criaco et al., 2017; Nguyen, 2018; Bloemen-Bekx et al., 2019; Hopp, Minarikova & Speil, 2019; Loderup et al., 2021). Apart from the influence of parents/family, the impact of being close to entrepreneurial figures cannot be overemphasized (the social context of the students) (Nguyen, 2018; Schmutzler, Andonova & Diaz-Serrano, 2019; Shi, Yao & Wu, 2019; Meoli et al., 2020). The research has also shown that peers play a key role in determining students' mindset regarding entrepreneurship and that belonging to a social group that positively enhances entrepreneurial activity, influences their entry into the business world (Komitu, 2019; Canestrino et al., 2020; Jegede, 2020c; Leonidou et al., 2020).

Table 1: Entrepreneurial intentions of the STEM students

	Percent
Do you have intentions of protecting any inventions from research output?	70.7
Do you have intentions of commercializing your research outputs?	75.7
Do you have intentions of starting a business after graduation?	86.1
Do you have intentions of starting-up a business based upon your research?	67.3

Table 2 below shows that on average only four out of every ten STEM students are exposed to a particular channel of entrepreneurship education/training. The informal channel was the most frequently used entrepreneurship education learning mode, while the informal approach was the least explored channel, generally, however, there was no significant difference in the frequency of the channels used. Hence, the study further tested the degree of association between each of the difference entrepreneurship education learning modes and entrepreneurial intentions of the STEM students.

Table 2: Learning modes for entrepreneurship education

	Percent
Formal learning mode (entrepreneurship module or course in Business Schools.)	40
Non-formal learning mode (participating in workshops, seminars, training, etc.)	43.5
Informal learning mode (trial learning, on-the-job learning, apprenticeship, etc.)	39.6

Test of Association between Entrepreneurship Education and Entrepreneurial Intention of the STEM students

Table 3 below shows a low value for the chi square and non-significant p-value between the formal learning mode of entrepreneurship education and all four variables capturing entrepreneurship intentions. These results indicate that there was no significant difference between the entrepreneurial intentions of the students exposed to the formal mode of learning and those who were not.

Table 4 below shows strong evidence of association between the non-formal learning mode of entrepreneurship education and three out of four variables capturing entrepreneurial intention (intentions to protect any invention from research output, to commercialize research outputs and to start-up a business from research) based on significantly high chi square values ($p< 0.05$). This is in line with a recent literature (Kakouris, 2017). More specifically, 79.40% of the STEM students who were exposed to the non-formal entrepreneurship learning mode intended to protect any inventions arising from their research, compared to 63.4% of the STEM students who were not exposed to the non-formal entrepreneurship learning mode. In total, 70.3% of the respondents had intended to protect any inventions emanating from their research. In like manner, 82.5% of the STEM students who participated in the non-formal entrepreneurship learning mode had intended to commercialize their research results, compared to 69.2% of those who had not engaged in the non-formal entrepreneurship learning mode. In total 75.2% of the respondents planned to commercialize their research outputs. Lastly, 79.4% of the STEM students who underwent the non-formal entrepreneurship learning mode planned to start a business based upon their research, compared to 58% of the STEM students who had not participated in a non-formal entrepreneurship learning course. In total 67.4% of the respondents envisaged starting a business from their research.

Table 5 below shows a low value for chi square and non-significant p-values between the informal learning mode of entrepreneurship education and all four variables capturing entrepreneurship intentions. This result indicates that there is no significant difference in the entrepreneurial intentions of the students who were exposed to the informal mode of learning and those who were not.

Table 3: Test of association between formal learning mode and entrepreneurial intention

		Entrepreneurship Education: Formal learning mode		Total	Value	Asymp. Sig. (2-sided)
		No	Yes			
Do you intend to protect any invention from your research output?	No	31.00%	26.70%	29.30%	0.327[a]	0.567
	Yes	69.00%	73.30%	70.70%		
Total		100.00%	100.00%	100.00%		
Do you have intentions of commercializing your research outputs?	No	24.70%	23.70%	24.30%	0.018[a]	0.893
	Yes	75.30%	76.30%	75.70%		
Total		100.00%	100.00%	100.00%		
Do you have intentions of starting a business after graduation?	No	12.80%	15.50%	13.90%	0.215[a]	0.643
	Yes	87.20%	84.50%	86.10%		
Total		100.00%	100.00%	100.00%		
Do you intend to start-up a business from your research?	No	33.30%	31.70%	32.70%	0.045[a]	0.832
	Yes	66.70%	68.30%	67.30%		
Total		100.00%	100.00%	100.00%		

Table 4: Non-Formal learning mode and entrepreneurial intention

		Entrepreneurship Education: Non-formal learning mode		Total	Value	Asymp. Sig. (2-sided)
		No	Yes			
Do you intend to protect any invention from your research output?	No	36.60%	20.60%	29.70%	4.345[a]	0.037
	Yes	**63.40%**	**79.40%**	**70.30%**		
Total		100.00%	100.00%	100.00%		
Do you have intentions of commercializing your research outputs?	No	30.80%	17.50%	24.80%	3.308[a]	0.069
	Yes	**69.20%**	**82.50%**	**75.20%**		
Total		100.00%	100.00%	100.00%		
	No	16.50%	11.30%	14.20%	0.761[a]	0.383

		Entrepreneurship Education: Non-formal learning mode		Total	Value	Asymp. Sig. (2-sided)
		No	Yes			
Do you have intentions of starting a business after graduation?	Yes	83.50%	88.70%	85.80%		
Total		100.00%	100.00%	100.00%		
Do you intend to start-up a business from your research?	No	42.00%	20.60%	32.60%	7.340[a]	0.007
	Yes	**58.00%**	**79.40%**	**67.40%**		
Total		100.00%	100.00%	100.00%		

Table 5: Test of association between informal learning mode and entrepreneurial intention

		Entrepreneurship Education: Informal learning mode		Total	Value	Asymp. Sig. (2-sided)
		No	Yes			
Do you intend to protect any invention from your research output?	No	32.60%	25.00%	29.60%	0.930[a]	0.335
	Yes	67.40%	75.00%	70.40%		
Total		100.00%	100.00%	100.00%		
Do you have intentions of commercializing your research outputs?	No	27.40%	20.00%	24.50%	0.980[a]	0.322
	Yes	72.60%	80.00%	75.50%		
Total		100.00%	100.00%	100.00%		
Do you have intentions of starting a business after graduation?	No	15.90%	10.70%	13.80%	0.740[a]	0.39
	Yes	84.10%	89.30%	86.20%		
Total		100.00%	100.00%	100.00%		
Do you intend to start-up a business from your research?	No	35.30%	28.10%	32.40%	0.813[a]	0.367
	Yes	64.70%	71.90%	67.60%		
Total		100.00%	100.00%	100.00%		

While the reviewed literature has affirmed that entrepreneurship education is key to developing students' entrepreneurial intentions, the present study proposes that the source/channel of entrepreneurial learning matters. The outcome of this study conducted on STEM students indicates that the most productive mode of business-related learning was the non-formal learning mode. This result may be because the non-formal mode typically involves experiential learning activities that foster the development of knowledge and skills. Non-formal entrepreneurship education emphasizes flexibility and personalized style of learning, owing to its utilization of diverse teaching and learning methods. Also, the goal of non-formal entrepreneurship education is not a academic degree or diploma, but rather, pure learning. The formal entrepreneurship education mode is curriculum based and involves working towards attaining a degree, thus, students are often focused on trying to excel in their modules/degrees rather than acquiring the very practical knowledge of entrepreneurship. This study opines that this practice may be one of the main reasons why the formal entrepreneurship education mode had little or no effect in engendering the entrepreneurial interests of the STEM students.

The informal entrepreneurship education mode, which is essentially 'on-the-job learning' often leads to errors/mistakes which can be costly at times. Owing to the fact that there is no set curriculum and very little teacher/instructor guidance, there is tendency for students to use their time inefficiently due to repetition, errors and recalling procedures. In addition, the fact that there are no pre-determined specific or measurable goals could limit the effectiveness of entrepreneurial learning, especially because there are no clear expectations regarding participants' achievements.

6. Conclusion

In conclusion, the study puts forward that non-formal entrepreneurship education, which sits somewhere in-between two extremes of educational methods, may be the best approach to building entrepreneurship interest in STEM students who naturally are disadvantaged with regard to 'learning about entrepreneurship', 'being entrepreneurial' and/or 'being entrepreneurs'. The study accentuates and endorses the uniqueness of non-formal entrepreneurship education because of its adaptive nature, not only to the individual needs of students, but to their various stages of learning. As mentioned previously, non-formal entrepreneurship education tends to be more versatile, participative and inclusive of the needs of the participating students which, in itself, becomes a source of learning.

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Innovation in Accounting Education: The Impact of Information Technology on Teaching Methods

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Abstract: Professional accountants today face many challenges caused by many factors, most notably the evolution of information technology - the digital revolution. Professional accountants are required to possess specific knowledge and skills inherent to the accounting profession, as well as generic skills. Higher education in accounting is one of the fundamental forms of formal education that enables professional accountants to acquire the necessary knowledge and skills and to develop professional competence. In accounting education, understanding the role of the modern professional accountant, required knowledge and skills, serves as the basis for establishing relevant teaching areas, units, and learning outcomes. Accounting education should consider market requirements related to the necessary skills and knowledge of professional accountants, and adjust accounting curriculum as well as teaching methods accordingly. In this regard, teaching methods are linked to learning outcomes and they should enable accounting graduates to acquire labour market-relevant skills and knowledge. There is a continuing need to adjust accounting education to market demands in the wake of ongoing academic discussions about the existing gap between accounting education and requirements of accounting practice. The aim of the paper is to explore current innovative teaching methods in higher education in accounting, with a particular focus on the means of integrating information technology (IT/ICT) into accounting education, based on a literature review of relevant sources. The paper also explores how innovative teaching methods affect the development of skills required of a modern professional accountant. The development of information technologies affects the content of education as well as teaching methods. A review of recent literature also focuses on analyzing the use of innovative teaching methods based on student attitudes and examines the level of information technology integration in accounting education and its impact on learning outcomes. The research findings contribute to the understanding of innovation in accounting education, summarizing new teaching methods and the impact of information technology in that context. These findings will primarily serve accounting educators by providing insight into innovative teaching methods and the extent of their current presence in accounting education, as well as their benefits.

Keywords: accounting education, higher education, teaching methods, information technology, learning outcomes

1. Introduction

Higher education is one of the fundamental forms of formal education that enables professional accountants to acquire the necessary knowledge and skills and to develop professional competence. Accounting education should consider market requirements related to the necessary skills and knowledge of professional accountants, and adjust accounting curriculum as well as teaching methods accordingly. Education is always a challenging process and the characteristics of todays' students make it even more demanding. The United States Pathways Commission in its report (AAA and AICPA, 2012, p. 13) recognized that "a new generation of students have arrived who are more at home with technology and less patient with traditional teaching methods" and also pointed out that "most first accounting courses still use traditional lecture and demonstration teaching methods" (p. 87). Saunders and Gale (2012, p. 849) summarizing the conclusions of previous research, define students "as radically different to previous generations both in their exposure to and expertise with technology and their resultant learning preferences and educational requirements". They are often referred to as 'digital learners' (Paz, 2017, p. 64) or 'digital natives' (Al-Htaybat, von Alberti-Alhtaybat and Alhatabat, 2018, p. 334).

2. Methodology

This paper aims to investigate current innovative teaching methods in higher education in accounting, with a particular focus on the means of integrating information technology (IT/ICT) into accounting education, based on a literature review of relevant sources. The paper also explores how innovative teaching methods affect the development of skills required of a modern professional accountant. In this regard, it is important to investigate how innovative teaching methods in accounting support students in developing skills and what skills are most commonly pursued in this context? A review of recent literature also focuses on analyzing the use of innovative teaching methods based on student attitudes and examines the level of information technology integration in accounting education and its impact on learning outcomes. To answer our research questions, we reviewed the

recent research on our topic of interest for the period from 2017 to 2021. We conducted a literature review by investigating the most prominent accounting education journals: Accounting Education, Journal of Accounting Education, and Issues in Accounting Education. We entered search words for teaching methods, teaching innovation, accounting. We only found results from the Accounting Education journal so we concentrated our analyses on the papers with open access from that period and analysed 17 papers summarized in Table 1 and Table 2.

3. Innovative teaching methods in accounting and development of students' skills

In their review of traditional versus IT-enabled teaching methods in accounting Dimitrios et al. (2013, p.74) point out how accounting education has mainly been done by utilizing "conventional (traditional) or slightly sophisticated teacher-centred methods". According to Opdecam and Everaert (2019, p. 244) it is also "dominant pedagogy in European universities" and it is also considered "cost-effective knowledge acquisition method" which explains its popularity (p.241). The traditional teaching method is mostly based on lectures that are provided to students in classes, followed by questions and discussions. Teacher–centred methods are more oriented on the ways of teaching (Ahmed, 2013, p. 22) which makes students more passive listeners rather than active participants. Student engagement is considered to have a mediating role in acquiring learning outcomes and "directly related to the level of success of the students" (Siddiqi, 2018, p. 131). Student engagement is vital to the learning process so teaching methods should encourage students' activity which is often very hard to achieve, especially in large student cohorts. A student-oriented approach, often also called a learner-centred approach, is a modern approach that combines a "more active, engaging, collaborative style of teaching" (Ahmed, 2013, p.22) which has a positive impact on student engagement in classes.

Preparing students for the labour market, to become professional accountants is a mission of accounting educators. Teaching methods that put students in the centre should certainly be a useful tool in that process. Innovative teaching and learning methods in accounting that were identified in our literature review are all student-oriented and directed towards enhancing students' activity, interest, overall engagement as well as towards the development of generic skills. The main findings are presented in Table 1, and more detailed analyses are in continuation.

Table 1: Innovative teaching methods in accounting education (analysed period 2017-2021)

Teaching/learning method	Authors	Country	Sample/Course	Benefits
Experiential learning (consisting of report writing and/or case studies)	Alshurafat et al. (2020)	Australia	Forensic accounting	Fostered teamwork ability
Flipped classroom	Williams, Horner and Allen (2019)	Tasmania (Australia)	First-year undergraduate students studying introductory accounting	Face-to-face students more preferred the traditional teaching model, flexible students were more adaptable to flipped classes
Cooperative learning cohort	Shawver (2020)	USA	Undergraduate advanced financial accounting course	Increased interest in the course, easier learning, more fun class
Team-based learning (TBL) – flipped classroom	Christensen et al. (2019)	Australia	Introductory accounting students	Improved some attitudes towards accounting: improved teamwork abilities, improved ability in performing the roles of task leader, socio-emotional leader, and information provider
Choice-based learning between lecture-based or team learning	Opdecam and Everaert (2019)	Europe (single country)	First-year undergraduate students - advanced financial accounting course	The majority of students select lecture-based learning; team learning has a positive effect on learning outcomes

Teaching/learning method	Authors	Country	Sample/Course	Benefits
Co-created role-play learning strategy	Powell (2020)	Australia	Auditing students	Creativity development and enhanced human skills, enhanced critical thinking and teamwork skills; improved understanding of the audit process; awareness of the role-play being an authentic form of assessment as it mirrors audit practice; and high levels of enthusiasm and engagement with the role-play
Simulation learning techniques: LEGO Serious play	ElKelish and Ahmed (2021)	United Arab Emirates	Undergraduate accounting students-introductory financial accounting course	Higher analysis learning outcomes

Alshurafat et al. (2020) investigated the pedagogical methods used by Australian universities in forensic accounting education that provide students experiential learning. Authors found that many educators utilized traditional teaching methods that included lectures, literature reviews, presentations and discussions on the forensic accounting course but also experiential learning consisting of report writing and/or case studies (p. 188).

Williams, Horner and Allen (2019, p.333) investigated a flipped classroom teaching and learning approach describing it as the "category of blended learning methodology: through blending traditional learning with technology-based learning, enabling traditional teaching to be transferred to videos and podcasts allowing students to view the materials in their own time". The traditional approach to teaching with lectures, workshops, and tutorials was utilized on the group of face-to-face students, while the group of flexible students had a partially slipped approach where they were obligated to listen to short pre-recorded lectures and prepare before attending online classes. According to the results of the qualitative research students perceived this method "to be useful as it required them to undertake the required reading before attending class" (p.344), but face-to-face students more preferred traditional teaching mode (p.344), and although they "felt they were somewhat prepared, with the reading before the class, they didn't agree that they enjoyed the learning process" (p. 343). Authors concluded that flexible students were more adaptable to flipped classes than face-to-face students.

Shawver (2020) conducted a survey to examine whether student performance improves in a cooperative learning cohort compared to traditional learning cohort. The author concluded on the mixed results of the study that "suggesting team learning leads to improved academic performance" (p. 259). The study suggested that "students in the cooperative learning cohort achieved higher quiz scores but performed worse (on average) than their counterparts in the traditional cohort on exams" (p. 259). Authors point to the benefits of cooperative learning increasing students' interest in the course, easier learning, and more fun class (p. 260).

Christensen et al. (2019) analyzed the influence of team-based learning (TBL) in accounting courses in Australia, on introductory accounting students. Team-based learning is discussed as a "pedagogical approach" (p. 195) which includes activities such as pre-reading activities, answering and discussing questions, assessing individual or team readiness. Unlike traditional group-based learning, TBL is characterized by more continuous work and dialog among members with the inclusion of teachers "encouraging reflection and collaboration, and incorporating self, peer, and teacher formative assessment" (Christensen et al. 2019, p. 198). Authors pointed out that TBL is a "key feature" (p.214) of the flipped classroom paradigm. According to the results of the study, TBL "improved some attitudes towards accounting, particularly among quantitatively inclined students" (p.215) and positively influenced the students' perception regarding performing "the roles of task leader, socio-emotional leader, and information provider" (p.215).

Similarly, Opdecam and Everaert (2019) investigated choice-based learning between lecture-based or team-based learning in a large class at a university in a European country. Team-based learning is a form that enables students to "learn not only from their own experiences'' but also the experience of their colleagues is a very

important part of this process (p. 241). The results of the study indicated that for the students who preferred team-based learning it had "positive effect on the learning outcomes" (p. 270). Also, the results revealed that when students were faced with the choice between lecture-based learning and team learning, the majority selected lecture-based learning.

Powell et al. (2020) investigated a co-created role-play learning strategy in audit education at a large Australian University and its impact on the student's perceptions of creativity skill development. Role-play strategy enables students to interact and indulge in the role and to "bring their interests, lived experiences, and audit context into the development of a storyboard and role-play performance" (p. 605). Results of the study suggested that students perceive the role-play learning strategy to be valuable in developing creativity skills as well as other skills such as: "enhanced critical thinking and teamwork skills; improved understanding of the audit process" (p. 632). Supported by the results of the study, Powell (2020, p.632) concluded that the role-play learning strategy "represents a highly engaging learning strategy" and that it has an impact on the development of the creativity skills important for future auditors.

One of techniques that enhance students' generic skills are simulation learning techniques. ElKelish and Ahmed (2021) conducted an exploratory study in the United Arab Emirates to investigate the impact of the simulation technique called LEGO® Serious Play. LEGO® Serious Play focuses on developing generic (soft) skills, including teamwork effects (ElKelish and Ahmed, 2021, p. 9). An inventory costing system was implemented to compare LEGO® Serious Play simulation technique and traditional teaching techniques through a practical problem-solving exercise on the whiteboard. The authors noted that "students showed significantly higher analysis learning outcomes using the simulation technique than the traditional teaching method. In comparison, the traditional teaching method better attained knowledge and application learning skills" (p. 13). Authors highlighted that unlike traditional passive learning, LEGO® Serious Play simulation game is "a useful alternative active learning tool" (p. 2) that helps students to develop specific learning skills.

4. Integration of information technology and teaching methods in accounting – analyses of trends

The development of information technologies affects the content of education as well as teaching methods. Since information technology is omnipresent, it is expected that it also has a significant role in the education process. Needles (2014, p. 36) points out that nowadays, "technology has become the dominant tool used in the teaching and learning cycles" and that it "enhances communication between teacher and students". Boritz and Stoner (2014, p. 363-366) indicated that educational technologies which were widely used in the classroom are presentation software such as PowerPoint and multimedia technologies such as podcasts and webcasts, Personal Response Systems also called Audience Response Systems, Computer-Assisted Learning (CAL) systems, Discussion boards and so on. Blankley, Kerr, and Wiggins (2018, p.81-82) surveyed accounting educators to conclude that spreadsheet software and word processing software are the two categories of software that students most often need to use in both undergraduate and graduate accounting courses, while specific software (audit, flowchart, tax) is used by a relatively low percentage of faculty courses in related disciplines (audit, AIS, tax), mostly in accounting software in AIS courses.

Needles (2014, p.36) stresses the following advantages when using IT in the teaching/learning process: "improved management of the educational process; more efficient use of teachers' and students' time; shorter learning time frames; more frequent one-to-one tutoring; increased time for learning and mastering complex skills in real settings; and better motivation of students through realistic, visual training sessions.'' Saunders and Gale (2012, p.849) synthesized previous research regarding the usefulness of IT in the teaching/learning process, and point out the appropriate use of technology can "both enrich the student learning experience and improve the effectiveness of student learning" as well as it can enhance student's participation. But it is also important to stress out that the integration of IT into accounting education also has numerous challenges and constraints. Long et al. (2019, p.7) identified several problems emphasized by accounting academics such as the cost of IT implementation and development as well as time-consuming preparations and training for educators. A study conducted by Braun et al. (2020, p. 349) revealed that potential employers value accounting courses in a traditional environment. According to research results, potential employers are not as confident in the accounting candidate's oral communication skills and interpersonal skills when a significant portion of coursework has been completed online.

In the review, we found various IT-supported teaching methods, whose benefits are described in continuation, and briefly summarized in Table 2.

Table 2: Integration of information technology into accounting teaching methods (analysed period 2017-2021)

Teaching/learning method	Authors	Country	Sample/Course	Benefits
Digital storytelling with the focus on visual metaphors	Taylor et al. (2018)	Australia	Second-year under-Graduate accounting students	The positive influence of visual metaphor and digital storytelling on student engagement: better-perceived quality of the teaching material, improved understanding of the course material, students were more alert during the lecture, students memorize better course content
Using visual metaphor in supporting personal development planning (PDP)	Osgerby et al. (2018)	UK	First-year students undertaking an undergraduate programme in Accounting and Finance	Improved students interest
Technology enhanced learning (TEL)	Beukes et al. (2018)	South Africa	Third-year auditing students	Preference of the majority surveyed student population regarding the use of ICT, in the learning process.
Eportfolio assessments integrated with a case teaching	Mihret et al. (2017)	Australia	Undergraduate Auditing course	Positive influence on student engagement and enhances self-desired student learning behaviour
Computer-based assessment (CBA) and/or computer-based feedback (CBF)	Helfaya (2019)	UK	Undergraduate accounting students	Positive effects on the way students acquire new knowledge and skills
E-learning and on-line teaching materials	Krasodomska and Godawska (2021)	Poland	International accounting course on the first year	The positive influence of participants' engagement in e-learning on their final performance
Games based learning	Silva, Rodrigues and Leal (2019)	Portugal	Accounting and marketing undergraduate students	Effective impact of game-based learning on student motivation and engagement
Games based learning	Silva, Rodrigues and Leal (2021)	Portugal	Accounting undergraduate students – first year	Proved the importance of gamification as a teaching tool from the viewpoint of motivation and commitment to learning, and the attitude to learning
Use of learning simulation platforms	Peng and Abdullah (2018)	USA	Undergraduate accounting information systems course	Learning is significantly influenced by tested simulations; this relationship is even better in an online learning environment.
Developing digital pedagogies	Coovadia and Ackermann (2021)	South Africa	First-year accounting students	Improved student's exam performance

Taylor et al. (2018) investigated digital storytelling with the focus on visual metaphors on student engagement in an accounting course in Australia. The meaning of storytelling has been extended to digital storytelling reflecting the new mode that involves "interactivity, photography, videos and games" (Taylor et al., 2018., p.554). Videos included audio, images, animations, and text, along with animated visual metaphors regarding certain accounting topics. The findings indicate that there is an influence of visual metaphor and digital

storytelling on student engagement since students considered "quality of the teaching material to be better, have an improved understanding of the course material, would take up a similar course and also study more for the course in their own time" (Taylor et al., 2018., p.561). Osgerby et al. (2018) investigated accounting students' perceptions at a Business School of a British university regarding the use of visual metaphors in supporting personal development planning (PDP). PDP can be considered as a set of processes to create an "action plan for personal, educational and career development" (p.570). Results suggest that students have positive perceptions of visual metaphors since 72% of them stated "being comfortable using visual imagery" and also two-thirds of students "found it enjoyable and not a boring experience (p.579). The authors suggested how the results of the study confirm "using visual metaphor as a stimulating exploration" (p.585) of students' goals and engagement in the personal development planning process.

Several studies have begun to examine technology-enhanced learning (TEL) which implies the use of digital, mobile, and networked devices within educational programmes (see Beukes et al., 2018). TEL enables a mixture of teaching and learning practices but its main benefits are that it "allows for additional time in class that gives rise to more opportunities for inter alia active and experiential learning" (Beukes et al., 2018, pp.514-515). Beukes et al. (2018) in South Africa concluded on "statistically significant differences between male and female students where the males adopted innovations quicker than the females" (p. 525), results of the study confirmed the preference of the majority surveyed student population regarding the use of ICT, particularly of the online simulation in the learning process.

Mihret et al. (2017) investigated the influence of ePortfolio assessments integrated with case teaching on the learner behaviour and also on the development of employability skills (critical thinking, professional judgment, teamwork, and problem-solving) in an online teaching environment. ePortfolio has been defined as "an electronic collection of evidence (artefacts) of reflection that attests to the achievement of specific higher-order learning outcomes" (Mihret et al. 2017, p.336). Students had to develop ePortfolios on their weekly progress regarding the learning process with special emphasis placed upon case discussions and then asked to analyze their content. Results of the study suggest that integration of ePortfolio into case methods has a positive influence on student engagement and enables "nurturing self-desired student learning behaviour in an online context" that are associated with employability skills (p. 351-352).

Helfaya (2019) analyzed the use of computer-based assessment (CBA) and/or computer-based feedback (CBF) in the teaching of accounting modules on the sample of undergraduate UK students. The author discussed the importance of assessment methods and their influence on the acquiring of new knowledge and skills for students. The results of the study were in favour of the proposition "that CBAF can definitely provide an effective supernumerary assessment and feedback approach for higher education undergraduate accounting students who are indeed Digital Natives" (p.89).

Krasodomska and Godawska (2021) investigated the impact of the application of online teaching materials on the final grades within an international accounting course at a university in Poland. The findings of the conducted survey indicated that there is a positive influence of participants' engagement in e-learning on their final performance.

Silva, Rodrigues and Leal (2019) investigated how gamification in the learning process influences students' motivation and engagement in Portugal. It is considered that games-based learning has a strong influence on the development of some generic skills such as communication, problem-solving, and decision making (see more in Silva, Rodrigues and Leal, 2021, p. 160). Games based learning (GBL) integrates games into the learning process and it is considered that "enrich the acquisition of skills and knowledge" (Nkhoma et al., 2018, p. 96) since "gaming activities are concerned with problem-solving situations and challenges providing the learner with a means of attainment". According to the results of the conducted study (Silva, Rodrigues and Leal, 2019, p.501) games "had an effective impact on student's motivation, flow, concentration, interaction, autonomy attitude and perceived learning" on the sample of both Accounting and Marketing students. Silva, Rodrigues and Leal (2021) also investigated dimensions that are important for students' learning experience when utilizing games-based learning. Results of the study show robust and mediated relationships between Motivation, Flow, and Attitude dimensions and their influence on the learning process. The authors consider that the results of the study empirically proved the importance of gamification as a teaching tool" from the viewpoint of motivation and commitment to learning, and the attitude to learning" (p.175).

Peng and Abdullah (2018) conducted an experimental study to investigate the effect of three different learning simulation platforms on students' learning effect in an accounting information systems course. Simulations enable students "to address real-world business and accounting cases" (p.209) and also "promotes the opportunity to introduce realism in the learning process" (p.210). According to the results of the study, learning is significantly influenced by tested simulations more precisely "by how realistic the simulation is and individual computer efficacy" (p.218). The authors also found that this relationship is even better in an online learning environment.

Coovadia and Ackermann (2021) investigated the influence of digital pedagogies on the student learning lifecycle at one of South Africa's largest universities over two academic years. Digital pedagogy includes the utilization of digital technologies in the process of transferring knowledge and digital platforms (like smartphones and tablets) in the process of learning (Coovadia and Ackermann, 2021, p.43). It is considered that digital pedagogy has an important role "in curriculum design and the development of skills such as advanced critical thinking, problem-solving and online navigation" (p.44). Technologies were divided into four categories aligned with the learning lifecycle: material, primary engagement, secondary engagement, and assessment (p. 49). The exam scores, used as indicators of students' performance showed "that involving 'tech savvy' students in the creation of a pedagogy" improved exam performance (p. 57) which demonstrated the effectiveness of the integration of various digital tools into student learning lifecycle.

5. Conclusion

Accounting education, as well as an accounting practice, faces many changes and challenges. Accounting educators have often been called to take necessary steps to adjust accounting curriculum and teaching methods to enable more efficient transition of the accounting graduates to accounting professionals.

In our review, we identified 'winds of change' and various innovative accounting teaching methods used in introductory accounting courses, forensic accounting, advanced financial accounting, international accounting and auditing courses. In general, students perceive positive benefits of innovative teaching methods that foster their engagement, motivation and understanding of the course content and enhance communication, team abilities and exam scores. It is also important to point out that most of the analysed studies are based on students' perceptions which presents certain limitation in understanding the influence of teaching methods on the learning outcomes.

Limitations of the conducted analysis, which is mainly based on one prominent accounting education journal, make the generalizability of conclusions difficult. But, research findings contribute to the understanding of innovation in accounting education, summarizing new teaching methods and the impact of information technology in that context. These findings can primarily serve accounting educators by providing insight into innovative teaching methods and the extent of their current presence in accounting education, as well as their benefits.

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Formalising HR Practices in Family-Owned SMEs. Integrating Environmental Factors and the Unified Theory of Acceptance and use of Technology (UTAUT) Model

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Abstract: Extant literature indicates that the Small and Medium-Sized Enterprise (SME) sector in South Africa plays a significant role in employment generation and economic development. As a result, the South African government has over the years leaned on the sector as an additional source of tax revenue, as an empowerment tool for marginalised Black majority and as a reliable contributor to employment generation. When it comes to employment creation, the contribution of family-owned accommodation SMEs is above average given the labour-intensive nature of their operations. Sadly, authorities agree that the economic contribution of these SMEs is often hampered by the informal nature that characterise their business practices. This informality stems from amongst other factors, the business operating environment that pervades all aspects of management including the Human Resource Management (HRM) practices. In light of this, this study sought to explore the effect of operating environmental factors on the SME owner-manager's decision to adopt formal human resource practices in family-owned accommodation SMEs in South Africa. The study used the Unified Theory of Acceptance and Use of Technology (UTAUT) to identify the environmental factors that influences technology adoption. Basing on these environmental factors and a review of extant literature, a structural model depicting a number of hypothesised relationships was proposed. Data was gathered from family-owned SME owner-managers using a conveniently distributed structured questionnaire. The collected data was used to test the veracity of the proposed model using Structural Equation Modelling (SEM). The study contributes to the body of literature that identifies factors that affect the decision to formalise HR practices by adopting and modifying an existing model and testing it within the HR context of family-owned accommodation SMEs in South Africa and beyond.

Keywords: human resource practices, family-owned, SMEs, South Africa

1. Introduction

The resource constraints that characterise the operations of Small and Medium Sized Enterprises (SME's), leaves the firms at the mercy of factors withing the operational environment (Banwo, et al., 2017; Van Dut, 2015). In fact, as Psychogios et al., (2016) notes the operational environment holds the operations of SMEs in such a tight grip so much that in most instances, the firms have no option but to continue adjusting their management practices in line with environmental pressures. Therefore, as Sitharam and Hoque (2016) reports the management practices such as marketing, finance and human resource management are often practised in an informal and reactive manner as they are constantly adjusted to match environmental pressures.

Therefore, even though Eid and El-Gohary (2013) reasons that SMEs are the lifeblood of the global economy owing to their contributions to employment creation, economic empowerment and wealth redistribution, Maduku (2015) takes a sceptical view and argues that, compared to developed economies, the contribution of SMEs to economic development in emerging economies like South Africa is grossly understated as a result of, among other factors, the informality that characterise their business operations. As a result, some global policy makers such as the International Labour Organisation (2016) have prescribed business formalisation as the all-powerful antidote needed to cure the problems impeding SMEs from effectively contributing to economic development in emerging economies. Based on the above outcry on the need to formalise SMEs, and the significant role they play in the South African and other global economies, this study seeks to develop and test a model examining how selected environmental factors interact with aspects of the Unified Theory of Acceptance and Use of Technology (UTAUT) to influence the decision to formalise Human Resource (HR) practices by family-owned accommodation SMEs in South Africa.

In other words, in order to avoid the shortcomings prevalent is previous HR formalisation literature, this study adopts a holistic approach recommended by Chan, Chong and Zhou (2012) by integrating operational environmental factors with selected factors from an existing decision-making model (UTAUT) to better understand the formalisation of Human Resource (HR) practices in family-owned accommodation SMEs. The date, no known study has taken this approach to understanding formalisation of HR practices among SMEs: (1) in a developing context like South Africa and (2) among family-owned accommodation SMEs. The study, therefore, seeks to close this gap by developing and testing an explanatory model on how selected environmental factors interact with *Effort Expectancy*, *Performance Expectancy*, and *Facilitating Conditions* to influence the decision to formalise HR practices by the owner-managers in family-owned accommodation SMEs in South Africa. Therefore, theoretically, the study contributes to the literature and debate on formalisation of HR practices by integrating aspects of an existing theory or model with empirical results from single studies. At a practical level, the study proffers guidelines which can be used to formalise HR practices among the family-owned accommodation SMES in South Africa and beyond.

2. Research objectives

The main objective of this paper was to develop and evaluate a model that explains how selected environmental factors interact with aspects of the UTAUT model such as *Effort Expectancy*, *Performance Expectancy* and *Facilitating Conditions* to influence the decision to formalise HR practices by owner-mangers in family-owned accommodation SMEs in South Africa.

3. Literature review

According to Poudel (2013) the small accommodation sector is by far the most widespread subsector in the tourism industry given the fact that, save for a few exceptions, tourists will eventually seek accommodation during their travels, a role that the family-owned accommodation SME sector seems to be playing so well. Therefore, one may conclude that the accommodation SME sector represent a substantial portion of national economies across the world and as such contribute significantly to the GDP of emerging economies like South Africa (World Bank, 2018). For example, in Africa, the sector contributed US$ 66 billion to GDP in 2016 and is projected to contribute US$100 billion by 2020 (World Travel and Tourism Council, 2018). Likewise, in South Africa the contribution by accommodation SMEs to the GDP increased from 6% in 2012 to 8% in 2015 signifying the critical role played by these entities in economic development (Statistics South Africa, 2018).

Notwithstanding the contribution of family-owned accommodation SMEs to economic development, researchers have raised a red flag in the management principles prevalent in these firms (Laforet, 2013; Poza & Daugherty, 2013). Chief amongst these concerns is the informality that characterise their business practices as dictated by factors withing the operating environment which weigh in on the structure, policies and operations of the SMEs (Miller, 2011).

3.1 The operational environment and HR formalisation

Banwo, et al., (2017) attributes the overbearing influence of the operational environment on the material and financial resources constraints in SMEs as compared to their larger counterparts. As such, this study intends to explore the effect of environmental factors on the owner-managers decision to formalise HR practices in family-owned accommodation SMEs in South Africa.

3.1.1 SME size and the formalisation of HR practices

According to Nolan and Garavan (2015) the number of employees in the SME firm as a measure of the size of the family-owned SME is a strong determinant of how HRM is practised in the firm. The same view is proffered by Kaufman and Miller (2011) who reports that the growth in size of SMEs leads to the employment of more people, which compels the firms to adopt sophisticated Human Resource (HR) systems in order to cope with the resultant organisational complexity. Likewise, Patel and Cardon (2010) argues that the small size characterising most family-owned SMEs firms implies that they suffer from budgetary limitations and these resource limitations impact negatively on any possible kneejerk decision to formalise HR practices until the firm grows to a certain size to afford such expenditures (Kim & Gao, 2010). On the basis of these literature findings, we propose the following hypothesis;

> *H_1: There is a positive and significant relationship between the size of the SME and the owner-manager's Performance Expectancy*

3.1.2 Availability of an HR department

According to Lobontiu and Lobontiu (2014) as the family-owned SME grows in size and employ more people, they are compelled to employ HR specialists to help manage the people management function. In the context of this study, this engagement of HR professionals in the firm signals the establishment of an HR department thus indicating that the size of the family-owned SME is significantly related to the presence of facilitating conditions for HR formalisation in the firm. The conditions arise from the reality that, as SMEs becomes larger and employ more people, the need to decentralise and communicate between employees and departments increases and this in turn, requires a certain level of specialisation and formalisation (Psychogios et al., 2016). This reflects the positive relationship between SME size and the presence of facilitating conditions in the firm as hypothesised in this study.

> *H_2: There is a positive and significant relationship between the size of the SME and the presence of Facilitating Conditions to establish a stand-alone HR department.*

3.1.3 SME location and HR formalisation

Moos and Botha (2016) make a point on the significance of firm location in in family-owned SMEs and argue that an estimated 71% of all family-owned SMEs operate on a single site and as such, location specific attributes become strong determinants of firm success. The afore-noted observation underscores that, in family-owned SMEs, the attractiveness or otherwise of the location in which the firm would be operating affects the managerial decisions and activities undertaken by the owner-manager (Sefiani, Davies and Bown, 2016). The inference, here, in the context of this study, is that the location of a family-owned SME has a significant impact on the owner-manager's perception on the usefulness of having an HR department in the firm and the resultant use of formal HR practices. Basing on this literature, the following hypotheses is proposed;

> *H_3: There is a positive and significant relationship between the SME's location and the presence of facilitating conditions to establish a stand-alone HR department.*

3.1.4 Facilitating conditions and HR formalisation

In UTAUT, *Facilitating Conditions* refer to the availability in the firm of the necessary support infrastructure and facilities to smoothly adopt a new innovation (Venkatesh et al., 2003). In this study, Facilitating Conditions represented by the presence of a professional HR person in the firm who facilitates the owner-manager's decision to formalise HR practices. This would allow owner-managers in family-owned SMEs to use formal HR practices with relative ease if there is a stand-alone HR department to assist them (Michiels, 2017; Steijvers et al., (2017) also argue that the presence of an HRM department in SMEs is associated with a higher level of relevant knowledge and expertise in the formal management of HR practices and in most instances decreases the costs of running the HR department. Therefore, drawing from the arguments above, the following hypothesis is proposed for further testing;

> *H_4: There is a positive and significant relationship between the presence of facilitating conditions to establish a stand-alone HR department in the SME and the owner-managers' Effort Expectancy.*

3.1.5 Institutional support and HR formalisation

According to the International Labour Organisation (2016) access to institutional support is one best method of instigating formalisation in SMEs. A common theme running across all countries in the world is that there is a relationship between SME formalisation and the availability of institutional support for SME development (Doh & Kim, 2014). For example, Visser and Chiloane-Tsoka (2014) note that the South African government has successfully used institutional support to develop and partially formalise the SME sector. As such, organisations such as the Small Enterprise Development Agency (SEDA) and the Small Enterprise Finance Agency (SEFA) were formed to facilitate the provision of institutional support to facilitate SME development and to incentivise their formalisation (Abor & Quartey, 2010). Therefore, basing on these literature claims, the following hypothesis is proposed;

> *H_5: There is a positive and significant relationship between the availability of institutional support for SME development and the owner-managers' decision to formalise HR practices in the SME.*

3.1.6 Performance expectancy and HR formalisation

In UTAUT Venkatesh et al., (2003) posit a significant relationship between a new system user's Performance Expectancy and the final decision to adopt or reject a novel system in organisations. This implies, in terms of this study that, the decision to adopt formal HR practices is strongly influenced by the owner-manager's expectation that the formal HR practices will bring measurable and positive returns to their SMEs. In fact, as Ajzen (2015) reports, the potential user's attitude towards adopting a novel practice is based on an assessment of views on both the consequences arising from adopting the new practice and expected contribution of the new practices to the needs of the SME (Performance Expectancy).

> *H_6: There is a positive and significant relationship between the owner-managers' performance expectancy and the decision to formalise HR practices in the SME.*

3.1.7 Effort expectancy and HR formalisation

According to Steijvers et al., (2017) even though firm formality is often perceived in negative light by many SME owner-managers as it dilutes his/her control over HR issues, many owner-managers are forced to consider hiring non-family HR professionals as HR issues get complex with firm formalisation. The situation becomes more complicated as the firms grows and acquires more employees and thus bringing complexity to HR management, which can only be cured by the employment of a professional. Basly (2015) admits to this analysis and reports that though the family may try to keep the HR function under the control of the owner-manager to safeguard family interests, HR complexity will force the hiring of a nonfamily HR expert.

In light of these literature views, the last hypothesis proposed in this study reads;

> *H_7: There is a positive and significant relationship between the owner-manager's Effort Expectancy and the decision to formalise HR practices in the SME.*

The literature reviewed in the preceding chapters revealed a number of environmental factors that influence the decision by the SME owner-manager to adopt the use of formal HR practices. Therefore, in line with this paper's objective, this literature was used to formulate a structural model that describes how selected environmental factors interact with *Effort Expectancy, Performance Expectancy and Facilitating Conditions* to explain the decision to formalise HR practices by owner-managers of family-owned accommodation SMEs in South Africa (Figure: 1). The nature of the relationships in the structural model is tested by the study's proposed hypothesis.

4. Proposed structural model

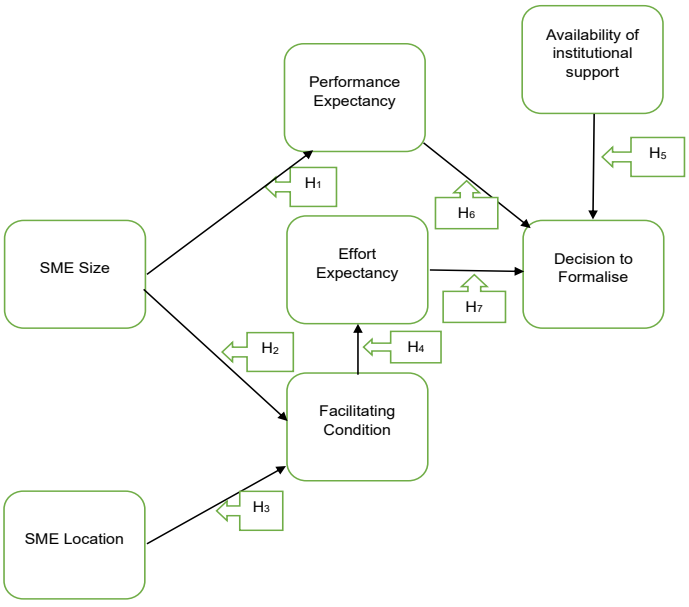

Figure 1: Proposed structural model

4.1 Operationalisation of structural model constructs

The constructs in the proposed structural model (Figure 1) are operationalised in Table 1;

Table 1: Operationalisation of structural model constructs

Construct	Meaning	Source
SME Size	SME size refers to the size of the family-owned SME in basing on the number of employees in the firm.	Nolan and Garavan (2015).
SME Location	Location in this study refers to either the rural or urban physical position from where the SME firm is operating.	Moos and Botha, (2016).
Performance Expectancy	Refers to the owner-manager's expectation that adopting formal HR practices will lead to better firm performance .	Ajzen (2015) Venkatesh et al., (2003).
Effort Expectancy	Refers to how much the SME owner-manager believes that the use of formal HR practices will be effortless, both physically and mentally.	Ajzen (2015) Venkatesh et al., (2003).
Facilitating Conditions	Facilitating conditions in this study represent the presence of a professional HR person in the firm to facilitate the decision to formalise HR practices.	Venkatesh et al., (2003).
Availability of Institutional Support	The support given to SMEs by the government and other institutions in the form of finance, credit guarantee schemes, tax breaks and market intelligence to incentivise them to formalise their HR operations (Doh & Kim, 2014).	Doh and Kim (2014

The meanings assigned to the constructs in the study's structural model suggest that the decision to formalise HR practices in family-owned accommodation SMEs in South Africa could be explained by how selected environmental factors (*Availability of facilitating condition, SME location and SME size*) interact with aspects of the UTAUT model; (*Effort Expectancy, Performance Expectancy* and *Facilitating Conditions*) to explain the decision to formalise HR practices by owner-mangers of family-owned accommodation SMEs in South Africa. The veracity of this model was tested by testing the proposed relationships with empirical data.

5. Research methodology

The study focused on family-owned SMEs in the Free State Province, South Africa and the primary unit of analysis where the SME owner-managers. Out of a population of 431 firms, the study used convenience sampling to gather data from 270 respondents in the research setting. The Structural Equation Modelling (SEM) technique was adopted to conduct data analysis for this study. The choice of SEM analysis was motivated by its ability to test proposed research models with multiple dependent and independent variables as the proposed structural model in this study.

5.1 Measurement model fit

In this study, Confirmatory Factor Analysis (CFA) was used to assess the extent to which the measurement model fitted into the collected data. After the CFA, the final measurement model indicated satisfactory fit indices after refinement; ($\chi 2$ = 283.395; P value= 000; DF=124) and as such, the final measurement model fitted satisfactorily with the collected data.

5.2 Structural model fit

The proposed structural model (Figure. 1) was tested for data fit using the Maximum Likelihood Estimation (MLE) method against the common fit indices prescribed by Hair et al., (2014). The final structural model **($\chi 2$ =1036.350; P Value=000; DF=543)** displayed satisfactory fit, a clear indication that the study's structural model fits the collected data satisfactorily and could be used with confidence to test the hypotheses proposed in this study.

6. Data analysis

6.1 SME size and the formalisation of HR practices

To test the relationship between SME size and the owner-manager's performance expectancy, the following hypothesis was formulated:

H_1: There is a positive and significant relationship between the size of the SME and the owner-manager's Performance Expectancy.

The regression analysis results indicates that SME size has a positive and significant influence on *Performance Expectancy* as its P value (.032) is lower than .05. This indicates that, as SME Size goes up by 1 standard deviation, *Performance Expectancy* also goes up by .164 of its own standard deviation thus indicating the positive relationship between SME size and *Performance Expectancy* of using formal HR practices in family-owned SMEs in the context of this study. These findings reaffirm a research by Patel and Cardon (2010) who concluded that the small size characterising most family-owned SMEs firms implies that they suffer from the "liability of smallness" and therefore operate on lean budgets. On the basis of these findings, the paper concludes that;

The size of the family-owned SMEs influences the owner-manager's expectation that formal HR practices will be useful in the firm.

6.2 Availability of an HR department

The second hypothesis drawn from the study's structural model read;

H_2: There is a positive and significant relationship between the size of the SME and the presence of Facilitating Conditions to establish a stand-alone HR department.

A statistical analysis in this study (estimate, -0,03; p-value, 0.61) showed that there is no relationship between SME size and the presence of facilitating condition for HR formalisation in the firm, at least among some family-owned accommodation SMEs firms, leading to the rejection of the proposed hypothesis.

As such, on this basis, this paper concludes that the size of the family-owned SME does not influence the decision to establish a stand-alone HR department in the firm.

6.3 SME location and presence of facilitating conditions

To test the relationship between firm location and the presence of facilitating conditions for HR formalisation, the following hypothesis was proposed:

H_3: There is a positive and significant relationship between the SME's location and the presence of facilitating conditions to establish a stand-alone HR department.

The regression analysis results indicates that the location of an SME has a positive and significant effect on *Facilitating Conditions* given that its P value (0.01) is lower than .05. The same view is also observed by Minai and Lucky (2011) who reports that, in SMEs, firm location is closely associated with the presence of expensive ventures like stand-alone HR departments with firms located in areas with abundant resources affording the luxury of establishing HR departments. Therefore, based on the fieldwork results and supportive extant literature, this paper concludes that, the location of the family-owned SME influences the decision to establish a stand-alone HR department to facilitate HR formalisation in the firm.

6.4 Facilitating conditions and effort expectancy

With regards to the relationship between the presence of facilitating conditions for HR formalisation and the owner-manager's *Effort Expectancy* of using formal HR practices, the following hypothesis was proposed in this study:

H_4: There is a positive and significant relationship between the presence of facilitating conditions to establish a stand-alone HR department in the SME and the owner-managers' Effort Expectancy.

The regression analysis results revealed that, as hypothesised in this study, *Facilitating Conditions* have a positive and significant effect on *Effort Expectancy* as its P value (0.01) is lower than .05. This implies that when Facilitating Conditions goes up by 1 standard deviation, Effort Expectancy also goes up by .691 of its own standard deviation. As such the null hypothesis was rejected. This findings is in sync with the assumption of the major theory informing this study, UTAUT. In UTAUT, Venkatesh et al., (2003) claims that the presence of Facilitating Conditions in a firm considering technology adoption, will ensure that the adoption process is free of effort which will positively impacts on the decision to accept and use the new technology. As such this paper concludes that, the presence of *Facilitating Conditions* to establish a stand-alone HR department in family-owned SME influences the owner-manager's expectation that formal HR practices will be easy to use.

6.5 Institutional support and the decision to formalise HR practices

Regarding the relationship between *Availability of Institutional Support* for HR formalisation and the decision by the owner to formalise HR practices in family-owned SMEs, the following hypothesis was formulated

> *H_5: There is a positive and significant relationship between the Availability of Institutional Support for SME development and the owner-managers' decision to formalise HR practices in the SME.*

A regression analysis of this hypothesis indicated that the null hypothesis was rejected, and the alternate hypothesis adopted as the fieldwork results indicates that the *Availability of Institutional Support* for SME development has a positive and significant effect on the *decision to formalise* HR activities in family-owned SMEs. This is given the fact that its P value (0.01) is lower than .05 implying that as *Availability of Institutional Support* goes up by 1 standard deviation, the decision to formalise also goes up by .502 of its own standard deviation.

This finding concurs with claims by Venkatesh et al., (2012) who notes that a favourable operating environment that support and encourage usage of new ideas at the workplace seen by the presence of effective facilitating conditions like the firm's policies, management support and encouragement.

On the basis of these fieldwork results and accompanying supportive literature, this paper concludes that, the availability of institutional support for HR formalisation in family-owned SMEs influences the owner-manager's decision to formalise HR practices.

6.6 Performance expectancy and the decision to formalise HR practices

The study also sought to test the relationship between the owner-manager's expectation that formal HR practices will be useful in the firm and his/her decision to formalise HR practices. To reveal the nature of this relationship, the following hypothesis was proposed;

> *H_6: There is a positive and significant relationship between the owner-managers' performance expectancy and the decision to formalise HR practices in the SME.*

The research results reveal that Performance Expectancy has a positive and significant effect on the owner-manager's decision to formalise HR practices since its P value (.008) is lower than .05. This signifies that when Performance Expectancy goes up by 1 standard deviation, the Decision to Formalise also goes up by .234 of its own standard deviation.

This finding tallies with the assumptions in the main theory guiding this study where Venkatesh et al., (2003) claims that a new system user's Performance Expectancy is a strong predictor of the user's final decision to adopt or reject a novel system in organisations. Therefore, the adoption of formal HR practices is strongly influenced by the owner-manager's perceptions that the formal HR practices will lead to measurable positive returns for the SMEs. This finding is also in sync with the principles of the Theory of Reasoned Action (TRA).

The theory is based in the premise that a new user's behaviour is based on rational decision-making and that the intention to act in a certain way is a function of the belief that the specific behaviour will lead to a given desired outcome (Ajzen, 2015).

As such, basing on the findings of this research this paper concludes that the owner-manager's expectation that formal HR practices will be useful to adopt in the firm influences the decision to formalise HR practices.

6.7 Effort expectancy and the decision to formalise HR practices

In pursuit of the relationship between the SME owner-manager's *Effort Expectancy* and the decision to formalise HR practices in family-owned SMEs, the following hypothesis was proposed

> *H_7: There is a positive and significant relationship between the owner-manager's Effort Expectancy and the decision to formalise HR practices in the SME.*

The regression analysis result in this instance accepts the null hypothesis as the results indicate that there is a negative relationship between *Effort Expectancy* of using formal HR practices and the *Decision to Formalise* HR practices in family-owned SMEs in South Africa. As the P value (0.01) is lower than .05. This means that, as *Effort*

Expectancy goes up by 1 standard deviation, the owner-manager's *Decision to Formalise* goes down by .399 of its own standard deviation.

These findings are at variance with the main theory supporting this study, the UTAUT which traces a positive relationship between *Effort Expectancy* of using novel technologies and the user's decision to adopt them (Venkatesh et al., 2012). As such this paper concludes that, the owner-manager's expectation that formal HR practices will be easy to use does not influence the decision to formalise HR practices

7. Conclusion and contribution of the study

This study contributes to the body of knowledge pertaining to the formalisation of HR practices in that it empirically tested the proposed integrated structural model. It also came up with a customised model on how selected environmental factors interact with *Effort Expectancy, Performance Expectancy and Facilitating Conditions* to influence the decision to formalise HR practices by family-owned accommodation SMEs within the South African context. The study does so by delineating the critical environmental determinants of the decision to formalise HR practices among family-owned SMEs within a specific context in South Africa (Figure 2), which can be used on similar economies.

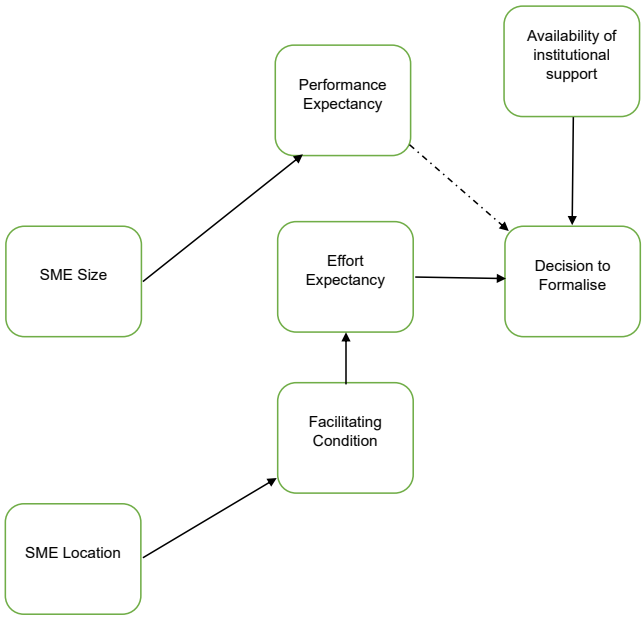

Figure 2: Environmental factors affecting HR formalisation

Figure 2 depicts the final environmental determinants of HR formalisation among family-owned accommodation SMEs in the Free State Province of South Africa. The figure shows that the decision to formalise HR practices is influenced by 4 factors; *Availability of Institutional Support, Performance Expectancy, Facilitating Conditions and Effort Expectancy.* In turn, Performance Expectancy is influenced by the owner-manager's level of education and the size of the SME. The presence of an HR department in the firm (Facilitating Conditions) in turn depends on the location of the firm. Finally, Effort Expectancy is influenced by the availability of an HR department in the firm.

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A Review of Barriers Facing Social Media Usage Among Firms in Less Digitalized Economies

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Abstract: In contemporary business, social media has become pervasive, most importantly, for social networking, content sharing, and online transaction. Given its reliability, consistency, and prompt features, social media unlocks a wide range of avenues for businesses such as digital marketing. Interestingly, marketing (or advertising content) that occurs via social media is known as social media marketing (SMM). Undoubtedly, social media marketing has made it possible for businesses to reach their targeted consumers easily, effectively, and instantly. Besides that, extant literature has shown that SMM also faces several challenges regarding its usage and adaptability in the business environment. Hence, the essence of this article is to review some empirical findings from previous related works on challenges faced by firms in less digitalized economies. We reviewed thirty empirical articles from reputable scientific databases (WoS, Scopus, EHRIPLUS, EBSCO, Google Scholar, etc.) and found that; cost of internet accessibility, social media expertise, and marketing/identity risk were major barriers inhibiting the usage of social media firms in less digitalized economies, particularly in the African and Asian continents. The managerial contribution of this paper is that it would inform SME owners, Entrepreneurs, and other industry players to outline or know the identifiable challenges of social media usage in the business operation and how strategic decisions can be taken in its adoption/applicability particularly on SMEs in developing countries in the future. The limitations and future research directions are presented in the concluding part of the paper.

Keywords: social media, SMEs, challenges, innovative tool, developing nation

1. Introduction

Social media has changed the interface of SME marketing. Currently, SMEs are found to use social media for various activities such as communication and marketing of their products and services in the 21st Century. SMEs currently use social media in advanced countries to advertise and communicate with customers on their products and services. It is therefore different from developing nations. In line with Asiodu et al., (2015), social media is defined as assessing knowledge from the web and other sources through the utilization of smartphones or computers from various websites and applications. SMEs are well recognized for their immense contributions to the economy in developed and under-developed countries (Virglerova et al., 2020; Belas et al., 2020; Ye & Kulathunga 2019; Amoah & Jibril 2020: Jibril, Kwarteng, Chovancova, & Denanyoh, 2020). Social media usage in developing countries has encountered some potential challenges making it difficult for SMEs to adopt it as used in various developed countries for marketing communication purposes. SMEs can adopt social media as a powerful marketing tool in the 21st Century's advertisements but some potential factors limit its adoption despite its significance or importance (Jagongo & Kinyua 2013; Amoah & Jibril 2020). However, its associated challenges usually supersede its full acceptability for advertising and marketing of products and services. The identifiable challenges of social media adoption in most developing countries have derived SMEs from its usage than the standard (traditional) way of advertisement, such as radio and television (Jibril et al., 2019). It is no doubt that infant and Existing SMEs prefer using the traditional way of marketing than using social media in an emerged economy. The challenges used in this context refers to the negative factors that affect social media applications to be adopted by SMEs for marketing and communication purposes in a less digitalized economy.

In the current dispensation of information communication of technology (ICT), social media serves as a powerful marketing tool for SMEs, but improper control and management of it could lead to exposure of firm's strategies and policies to its competitors and invariably affects the brand image of the firm (Chikandiwa et al., 2013). Due to this, SMEs in the less digitalized economy always prefer using their old traditional form of marketing than adopting a modern-day tool that will expose their marketing strategies and hence affects its products and services brand popularity. However, Amoah &Jibril, (2020) categorically revealed that internet accessibility affects SMEs ' adoption of modern-day technologies such as social media applications as used in the digitalized economies. Therefore, advertising on social media platforms like Facebook, Twitter, and Instagram would not be better than using the traditional way of marketing and communication. On top of that, Ericson et al., (2016); Lekhanya (2013) established that business owners emphasized profit-making rather than upgrading technology to reduce their profitability. The said publications further opined that SMEs are always comfortable using old traditional marketing systems than adopting modern-day technology like social media, which demands regular systems/link upgrades. This system/link upgrade is always applied to both business owners and customers.

As a result of various contributions and benefits gained from using social media, SMEs are consistently confronted with identifiable challenges from using social media in the current era of information communication technology (ICT) in a less digitalized economy. Although ICT has provided more grounds for social media usage, some potential challenges such as the cost of the internet, social media experts, and marketing/risk exposure have become inherence to the adoption of social media (Kaplan & Haenlein, 2010; Nam, 2019). Since few research works have been conducted on the study area, it, therefore, gives room for more research to be done. The study would therefore be beneficial to both theory and industry players. The current study contains a literature review, proposed conceptual framework, methodology, discussion, conclusion, and limitation.

2. Literature review

2.1 High charges from internet providers and inadequate funds on the part of SME management

SMEs are always concerned about using modern technologies such as social media could be integrated into their marketing of products and services in the 21st century (Ainin et al 2015; Alam & Noor, 2009; Jibril et al.,2020). However, the cost of the internet has deterred them from its adoption or integration. SMEs consider the cost of the internet as a financial burden based on their financial stability or position. Most SMEs in the less digitalized economy faces economic challenges such as inadequate funding opportunities, which crippled them to take different decisions such as adopting social media for marketing purposes. Furthermore, adopting social media as a marketing tool for advertising products and services requires the purchase of software and installation of safeguard software to prevent cybercrimes within the firm (Awiagah & Lim 2016). Besides, Ainin et al. (2015) established that social media is a valuable tool for SMEs to promote their products and services and ensure keen competition. However, business owners and entrepreneurs should be concerned about the cost involved in purchasing software packages and must be ready to combat hacking rampant in emerging economies. This makes SME clients in emerging economies less confident in surfing through social media platforms for products or services. Instead, they purchase their items from developed economies because of good safeguard policies that protect SMEs' images from cybercrimes (Ahmad et al., (2017). Aside from these negative aspects of the use of social media, it has some advantages such as revenue generation, new customers' attractions, increased brand awareness, loyalty, and brand reputation are neglected by SMEs. Ahmedova (2015) emphasized that social media has brought about a technological change in market globalization and created possibilities for SMEs to reinforce its development. Still, the cost involved in purchasing data or connecting wifi has always become a topical issue of concern to both the firm and its customers.

2.2 Inadequate skilled personnel to handle social media platforms during an advertisement

The use of social media has received a tremendous reception since its inception. SMEs and companies have dully welcomed it with happiness based on its distance coverage. However, Chikandiwa et al., (2013) affirmed that social media is a marketing tool that SMEs can use but needs experts to handle it. The said publication revealed that social media requires experts to handle it, so leaving it to inexperienced personnel would cause huge damage to the firm. Also, adopting social media involves following systematic guidelines and requiring graphic designers' services to post catchy content to attract new clients and ensure enormous growth among firms (Oda & Odia, (2013). However, Tanya et al., (2014) established that when experts do not handle social media, it might reveal the firm's information publicly, affecting its reputation. Its consequences may lead to the firm's collapse. Besides, online marketing of products and services requires enough expertise. Such experts cost SMEs, which

eventually posed as a negative marketing strategy for them to adopt. Thus, Vernuccio & Ceccotti (2015) concluded that strategic and organizational challenges prevent SMEs from integrating social media as a marketing communication tool for a paradigm shift. The said publication further revealed a high risk of losing brand management control because conversations are typically held online with/by others.

Similarly, Lekhanya (2015) suggested that SMEs face managerial skills such as experts to handle social media applications and therefore prefer to use traditional systems in advertising their products and services. Also, Ainin et al. (2015) investigated factors influencing social media usage by SMEs and its performance, using Facebook as a classic example. They finalized those certain aspects warrant management acceptance for social media, such as compatibility, cost, trust, and interactivity. A survey conducted by Hutchins (2016) with LinkedIn discovered that this social media platform as an advertising tool is gradually gaining acceptance by customers. Thus, SME managers need to use it professionally to acquire the services of skilled and qualified personnel. The benefits of skilled and qualified personnel would be needed for the survival of SMEs as they can manage these social media platforms professionally (Cheng et al.,2016).

2.3 Fear of loss of reputation and exposure of business strategies to competitors

Social media continues to perform tremendously for SMEs found in developed countries due to information communication technology (ICT). Such SMEs in advanced countries are always prepared enough to control the associated risk that social media might bring to their businesses. Due to this fact, social media is seen as a powerful tool for marketing their products and services in this contemporary time. Social media integration as a marketing tool positively influences SMEs and exposes business strategies to their competitors within the shortest possible time (Chege et al., 2020). This exposure limits the decision-making of business owners to adopt social media as a formal technology than to depend on the traditional method, which does not involve revealing such marketing/risk exposure. Getahun (2020) revealed that customers and SMEs feel exposed from time to time using social media since constant/regular upgrades may negatively affect them when carefully not adhered to social media regulations. In avoiding such difficulties and feel humiliated, they consistently avoid such technology. Mello & Ter-Minassian, (2020) extensively researched digitization challenges and opportunities for Sub-national Governments and firms. However, their findings pointed out that staff with less compensation do not provide maximum information for firms' improvement and innovation. As a result, business owners and managers feel unsecured to adopt social media to perform functions like marketing and communication of their products and services.

3. Methodology

The researchers wholly adopted the qualitative inquiry approach to execute the objective of the present study (Amoah, 2020). Upon all the types of qualitative research approaches, document analysis is the preferred choice to be used for this present study. Document analysis is defined as the retrieval of information (printed and manual) to arrive at a meaningful understanding of a specific problem or challenge (Bowen, 2009). Using document analysis appears to be simple, it is an excellent point of drawing from a pool of relevant phenomena based on its wider coverage. In doing so, databases of Scopus, Web of Science, and Google Scholar will be used for the retrieval of articles relating to the study area to accomplished this task. To get the preferred information needed, a keywords search was used to retrieve scientific papers published in the scope of the study area. The adoption of document analysis has been consistently used by many scholars and researchers like Amoah & Jibril (2020); Osakwe, (2016); Keles et al., (2020); Maharani & Gozali, (2015) to execute qualitative research. The use of document analysis provides a variety of information or articles to the researcher to thoroughly make a meaningful conclusion out of it and also gives more insight on the study area from different perspectives. To fully achieve the objective of the present study, some secondary sources were also adopted. In all the researchers used a total of thirty-four (34) scientific papers out of fifty-three (53) downloaded papers to meaningfully achieved the needed results of the current study. Keywords such as emerging economies, digitization, social media, and SMEs were used to search the database. Finally, all the scientific papers used for the study were written and published in English.

3.1 Proposed conceptual framework and proposition development

In line with the extensive literature review done on the study area, the researchers, therefore, conceptualize and hypothesize the following for future Studies:

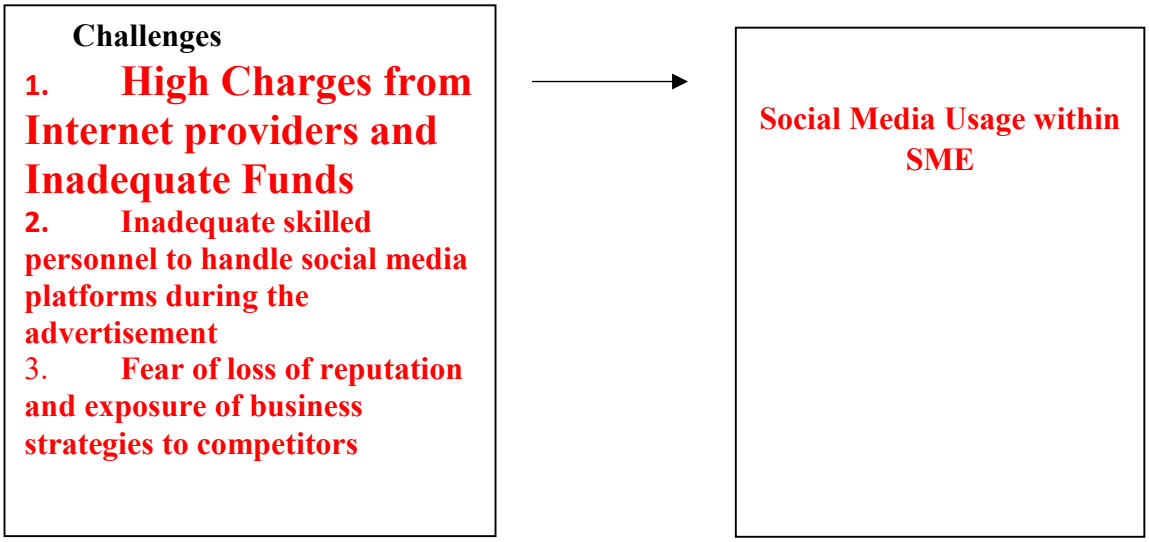

Figure 1: Conceptual framework: Source: Authors' own

Proposition 1*: High charges from internet providers and inadequate funds would negatively affect Business owners/managers not to adopt social media for marketing and communication purposes or activities.*

Proposition 2*: Inadequate skilled personnel to handle social media platforms during advertisement would negatively deter SMEs from adopting it as a modern-day tool for business dealings like marketing.*

Proposition 3: *Fear of loss of reputation and exposure of business strategies during advertisement would negatively deter SMEs from adopting it as a modern-day tool for business dealings like marketing.*

4. Theoretical and practical implications

The present study is useful to both theory and practice. Since the service-based organization plays a major role in the economy of a developing nation, it is of good use to conduct such a study to throw more light to the industry players and practitioners on how they can intensify their marketing and communication strategies in a less digitalized economy.

Also, this paper's practical implication or contribution would help SME owners, entrepreneurs, and other industry players outline or know the identifiable challenges of social media usage and adopt some measures to tackle such challenges. Secondly, this paper would also help business owners and managers of the fashion industry consistently establish the relationship between social media and its challenges, such as the high cost of internet data, inadequate skilled personnel, and fear of losing its reputation. However, these challenges can be dealt with when information communication technology is much improved since the government and other communication agencies are intensifying the ICT in the country.

5. Suggestions for future research and conclusions

In conclusion, this paper established a link between social media challenges in a less digitalized economy perspective and SMEs ' adoption for marketing their products and services. Authors identified that social media continues to be a perfect marketing tool that SMEs can employ despite its inherent challenges in emerging economies, which discourages business owners and practitioners from adopting social media for the marketing of products and services

Again, there are various reasons why, as we advance, SMEs must adopt social media platforms, especially in developing countries, as it can strengthen their basis for operations and satisfy customers' needs. However, governments in emerging economies like Africa and Asia need to collaborate with academic research institutions to provide lasting solutions to internet hacking and cybercrimes, which deter SMEs from switching from traditional marketing to social media platforms.

Because qualitative methodology was used for the study based on the proposed conceptual framework (see Figure 1), there exists some relationship between the high cost of internet data from service providers and inadequate skilled personnel to operate these social media platforms. Hence future research needs to be conducted using quantitative data to empirically test results and draw a meaningful conclusion for future studies.

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The Entrepreneurial University and Innovation: A Systematic Literature Review

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Abstract: Since their inception, universities have played an important role in economies, however, over the years, many factors have led to changes in their structures and missions. Consequently, the methodology of this study had as its main objective to carry out a systematic review of the literature to evaluate the research carried out on the relationship between entrepreneurial universities (EU) and innovation, updated, with the intention of contributing to the systematization of the main areas of research on this theme. To this end, a search was conducted in ISI/Web of Science, on entrepreneurial universities and innovation. From this search, we identified clusters and it allowed us to reach our results, bringing our contributions, grouping the literature into three major areas: innovation, entrepreneurial universities, knowledge transfer and academic spin-offs; innovation, entrepreneurial universities and academic entrepreneurship; innovation, entrepreneurial universities and triple helix model.

Keywords: entrepreneurial university, innovation, knowledge transfer, academic spin-offs, academic entrepreneurship, triple helix model

1. Introduction

In the past two decades, governments around the world have become increasingly directive in their financing for the higher education sector and have pushed to transform research into economic growth, innovation and employability (Etzkowitz et al., 2000). This pressure transformed universities and made them more entrepreneurial in nature (Guerrero & Urbano, 2012). Thus, and according to Etzkowitz (1983), entrepreneurial universities arose from the need for academic researchers to find recipes that would allow them to carry out their research.

Thus, Gibb (2013) describes the entrepreneurial university (EU), as an institution designed to enable its constituents to demonstrate innovation in teaching, research and the use and transfer of knowledge across borders. Higher Education Institutions (HEIs) were also encouraged to assume greater responsibility for local economic development, mainly through innovation activities (Perkmann et al. 2013; Simões et. al., 2019).

Therefore, the article is structured as follows: after this introduction, a state-of-the-art on entrepreneurial universities and innovation will be carried out. Then the methodology adopted in the study is explained and later the results of the relationship between entrepreneurial universities and innovation will be analyzed. Finally, the conclusions, the limitations of the study, with recommendations for future research and our contributions. The latter come as our systematic literature review (SLR) differs from the 2 previous reviews found, as the time base of the analyzed articles has been extended to the present date, thus including the large number of recent articles, between the years 2019 and 2020, in the category's management, business, economics and business finance, which show the growing relevance of the theme.

2. Methodology

This investigation is based on a systematic literature review (SLR), with the function of bringing knowledge about entrepreneurial universities (EU) relating them to innovation.

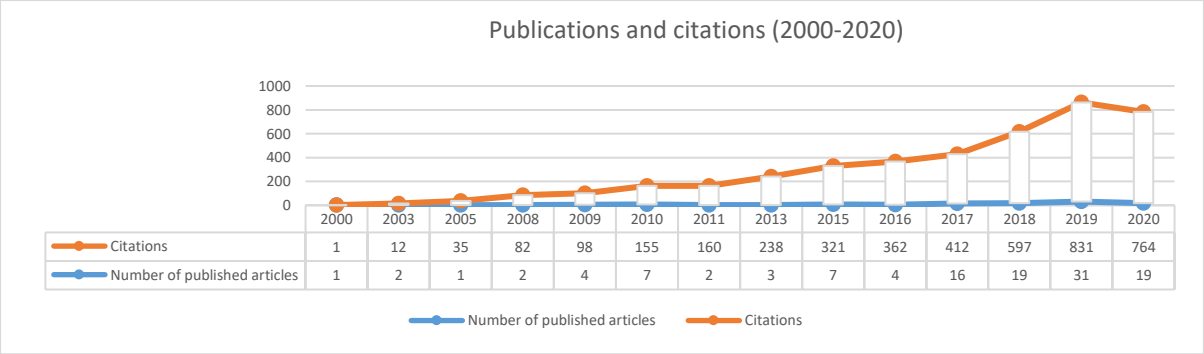
2.1 Data collection

The search for the articles was carried out using the Web of Science database. The research was conceived, without time restrictions, to evaluate the research carried out on the relationship between the US and innovation and to contribute to the systematization of the main research areas of this theme.

Thus, in the first place, a research was carried out containing the words ((“entrepreneurial university” and innovation)), limiting the type of document to article (122 articles) and review (6 articles), to the category a management, business, economics and business finance and the English language, as shown in the following figure (Figure 1). With these words in the title, we obtained 8 articles and in the topic we obtained 128 articles. Thus, our analysis fell on these 128 articles.

2.2 Descriptive analysis of the data

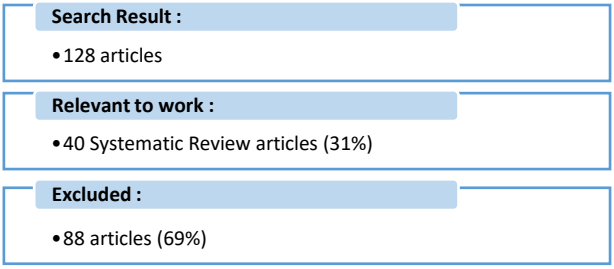
Figure 1 shows an evolution in the number of publications and citations during the period of analysis (2000-2020) and it appears that there is a high incidence of publications found mainly in the last 5 years, with a great relevance of publications and citations in the year of 2019 (31 articles and 831 citations).



	2000	2003	2005	2008	2009	2010	2011	2013	2015	2016	2017	2018	2019	2020
Citations	1	12	35	82	98	155	160	238	321	362	412	597	831	764
Number of published articles	1	2	1	2	4	7	2	3	7	4	16	19	31	19

Figure 1: Number of publications and citations (2000-2020)

Second, the articles were analyzed based on the titles and abstracts. In a third phase, after checking the abstracts and titles of the initial research and excluding the non-relevant articles, it was verified which studies were truly relevant to the systematic review work. Thus, an article will only be included in the result, if: i) its approach analyzes the EU and innovation; ii) and its relevance is important for the type of work to be carried out. The final sample is thus composed of 40 articles.



As for the methodologies used to identify the EU's relationship with innovation, there is a greater incidence of studies using qualitative methodology, using interviews (around 40%, that is, 16 articles) as research instruments. Regarding data analysis techniques, content analysis is predominant (around 55%, that is, 22 articles).

Table 1 systematizes the Top 10 of the various articles selected and most cited for the study.

Table 1: Top 10 of the most cited and included articles in the study

Authors	Year	Journal Name	Title of the article	Citations
Etzkowitz	2003	Research Policy	Research groups as 'quasi-firms': the invention of the entrepreneurial university	668
Etzkowitz & Klofsten	2005	R & D Management	The innovating region: toward a theory of knowledge-based regional development	248
Bramwell & Wolfe	2008	Research Policy	Universities and regional economic development: The entrepreneurial University of Waterloo	243
Philpott, Dooley, O'Reilly & Lupton	2011	Technovation	The entrepreneurial university: Examining the underlying academic tensions	201
Martinelli, Meyer & Von Tunzelmann	2008	Journal of Technology Transfer	Becoming an entrepreneurial university? A case study of knowledge exchange relationships and faculty attitudes in a medium-sized, research-oriented university	131
Guerrero, Urbano & Fayolle et al.	2016	Small Business Economics	Entrepreneurial universities: emerging models in the new social and economic landscape	88
Hayter	2016	Small Business Economics	A trajectory of early-stage spinoff success: the role of knowledge intermediaries within an entrepreneurial university ecosystem	61
Schmitz, Urbano, Dandolini. et al.	2017	International Entrepreneurship and Management Journal	Innovation and entrepreneurship in the academic setting: a systematic literature review	55
Yusof & Jain	2010	International Entrepreneurship and Management Journal	Categories of university-level entrepreneurship: a literature survey	48
Etzkowitz, Henry	2017	Technological Forecasting and Social Change	Innovation Lodestar: The entrepreneurial university in a stellar knowledge firmament	26

Subsequently, based on the 40 selected articles, after all the reviews, the articles included in the study were obtained per year (Figure 2), showing that there is a high incidence of studies on entrepreneurial universities, relating them to innovation in the last 2 years (2019-2020).

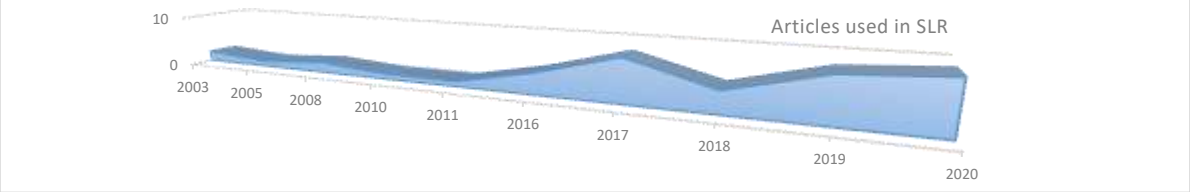


Figure 2: Articles used in SLR per year

3. Discussion of results

Based on the articles included in the SLR, we can group them in the OE by three thematic areas (clusters), since we can verify that the majority of studies focus on the following three research areas: i) the relationship of innovation with entrepreneurial universities , knowledge transfer and academic spin-offs (45% of articles - n = 18); ii) in the relationship between innovation and entrepreneurial universities and academic entrepreneurship (38% of the articles - n = 15); and iii) the relationship between innovation and entrepreneurial universities and the triple helix model (17% of articles - n = 7).

From the analysis of these clusters, we can infer that they are closely related to each other and that there is complementarity between them. This complementarity reveals that entrepreneurial orientation is associated with entrepreneurial universities, academic entrepreneurship and the creation of spin-offs, resulting from the transfer of knowledge and technology, thus presenting our clusters and then our SLR framework in the following figure (Figure 3).

3.1 Cluster 1: Innovation, entrepreneurial universities, knowledge transfer and academic spin-offs (N = 18)

The third mission of universities has gained momentum in recent years and has been strongly promoted by governments as a means of favoring development and territorial growth (Etzkowitz et al., 2000).

Entrepreneurial universities are characterized by increasingly complex mixtures of public-private involvement, getting involved in different ways and to different degrees (Nelles & Vorley, 2011).

In this way, governments at the regional, national and international levels consider the entrepreneurial university to have an important role to play in the economic development of their region through the transfer of knowledge to the industrial sector (Etzkowitz, 2003).

Therefore, an important contribution of the entrepreneurial university concerns academic entrepreneurship and the establishment of new spin-off companies based on technologies originating from university research (Shane, 2004). Academic spin-offs provide an important vehicle for generating innovations, accelerating productivity, and creating jobs and prosperity for regional economies, a fact also corroborated by Shane (2004) who argues that an important contribution of the entrepreneurial university is related to the creation of new spin -offs and is a window of socioeconomic contributions to the region (Guerrero et al. 2015, 2016; Simões et. al., 2012).

In conclusion, and according to O'Shea et al. (2005, 2007), universities have long depended on the success of technology transfer, although the quality of faculty, funding and business skills are also predictors of secondary activities at the university. Universities have given increasing importance to the creation of new companies as a mechanism for the commercialization of intellectual property, and this increase in university business activity has social implications (Ratten & Welpe, 2011). Therefore, innovation reflects the company's tendency to support new ideas and promote creative processes that aim at the development of new products and services (Walter et al., 2006 Silva et. Al., 2014).

3.2 Cluster 2: Innovation, entrepreneurial universities and academic entrepreneurship (N = 15)

The central activities of universities were universally recognized as teaching and research, but currently universities have undergone internal transformations in order to adapt to external conditions and legitimize their role in the economy, giving rise to a new type of university: the entrepreneurial university (Guerrero & Urbano, 2012, 2014).

In this way, the emerging role of a modern entrepreneurial university is dichotomous, focusing on both innovation and entrepreneurship (Urbano & Guerrero 2013). Thus, a dichotomy emerges for the entrepreneurial university, with certain parts of the university contributing as drivers of innovation, while other parts contributing as drivers of entrepreneurship (Guerrero & Urbano, 2014; Svensson et al., 2012).

The term entrepreneurial university is not new and a survey of the literature that combines the concept of entrepreneurship with universities will reveal that this connection denotes a variety of activities that occur in the context of higher education (Wedgwood & Pemberton, 1999). In turn, the concept of academic entrepreneurship is used to describe the variety of ways in which academics market the knowledge they produce (Slaughter & Leslie, 1999) and according to Etzkowitz (2003), academic entrepreneurship arose from external stimuli.

The entrepreneurial university is the result of the development of an internal logic of academic development that expanded academic entrepreneurship, moving from teaching functions as the only activity to research functions aimed at companies (Etzkowitz, 2003), and the entrepreneurial university has the capacity to generate a focused strategic direction (Clark, 1998).

Over the past three decades, entrepreneurship has been perceived as a major driving force for local economies (Garo et al., 2015). And the same authors report that it has a positive impact on the evolution of ideas and innovative business initiatives that support the creation of new labor markets, boosting economies, developing new solutions to problems, creating technology that improves efficiency (Garo et al., 2015). Thus, individuals

and groups can be trained for entrepreneurship through formal education and teaching and learning schemes (Jones-Evans & Klofsten, 1997).

According to Nicolaides (2011), higher education institutions (HEIs) have an important role to play in regional innovation systems and should strive to carefully consider the needs of local development and support the promotion of entrepreneurial education initiatives for meet the socio-economic needs of countries.

The result of dynamic and high-growth businesses (with potential for job creation) requires that universities be vibrant entrepreneurship ecosystems, characterized by the breadth and depth of initiatives / offers in three main dimensions: academic entrepreneurship, initiative and support and entrepreneurial behavior (Peppler, 2013). The goal is to change higher education institutions from merely offering academic entrepreneurship with less regard for sustainable results in the local socio-economic circle, to becoming entrepreneurial universities (Peppler, 2013).

Thus, and in conclusion, the challenge facing universities and individuals charged with developing and delivering education for entrepreneurship, is to build sustainable learning communities that balance the requirements of academic rigor with the realities of entrepreneurship (Winkel, Vanevenhoven, Drago, & Clements, 2013).

3.3 Cluster 3: Innovation, entrepreneurial universities and triple helix model (N = 7)

In the knowledge society, universities are increasingly challenged to become more socially and economically relevant organizations (Nelles & Vorley 2011). To do this, universities went through academic revolutions (Etzkowitz, 2003). The first revolution added the mission of generating knowledge through research to the traditional mission of pre-serving and transmitting the knowledge with which universities were established (Etzkowitz, 2003). The second revolution made economic and social development a third mission for universities, in addition to teaching and research (Etzkowitz 2003). This means that in addition to conserving and transmitting knowledge, universities also need to create knowledge and put it to use (Etzkowitz 2013).

The concept of an entrepreneurial university (Etzkowitz, 2004) guided the strategic planning of most universities worldwide.

For Guenther and Wagner (2008), entrepreneurial universities are multifaceted institutions with mechanisms designed to directly support the transfer of technology from universities to industries (Guenther & Wagner, 2008). These universities are an important catalyst for economic and social development, especially because they generate and exploit knowledge as opportunities (Wasser, 1990; Harrison & Leitch, 2010; Urbano & Guerrero, 2013).

These organizations are now recognized as important drivers for self-development and innovation and are an adequate response to success in highly turbulent situations and unpredictable markets, representing the next stage in the development of education (Sperrer et al., 2016).

In recent decades, many universities have taken steps to develop a third mission, promoting technology transfer activities (Perkmann et al., 2013). In this way, an entrepreneurial university is the concept that was developed to ensure that the knowledge generated contributes to regional economic development (Bygrave & Minniti, 2000).

In the 1990s and early 2000s, the literature was influenced by the triple helix model (Etzkowitz & Leydesdorff, 1995).

The triple helix model was first theorized by Etzkowitz and Leydesdorff in the 1990s with the publication “The triple helix, university-industry-government relations: a laboratory for knowledge-based economic development” (Etzkowitz & Leydesdorff, 1995) . The triple helix model is used to investigate how interactions between university, industry and government impact economic and social development, as well as how each component evolves and then gives rise to hybrid institutions (Etzkowitz & Leydesdorff, 1995).

Thus, acting as a local actor to support the company, as well as a direct driver of innovation, is the concept of an entrepreneurial university (Etzkowitz 2003). The concept of entrepreneurial university (Gibb, Haskins &

Robertson, 2009) is also more widely relevant as one of the focal points of the triple helix, which initiates collaboration between universities, governments and industry (Etzkowitz 2008). In this model, Etzkowitz (2008) suggests that universities develop close regional ties through the continuous exchange of mutually beneficial knowledge, defined as activities in the third sector.

In conclusion, and supporting the model described above, the entrepreneurial university can be defined here as mainly focused on the area of innovation, the activities of the university itself (Fuller, Beynon & Pickernell 2017).

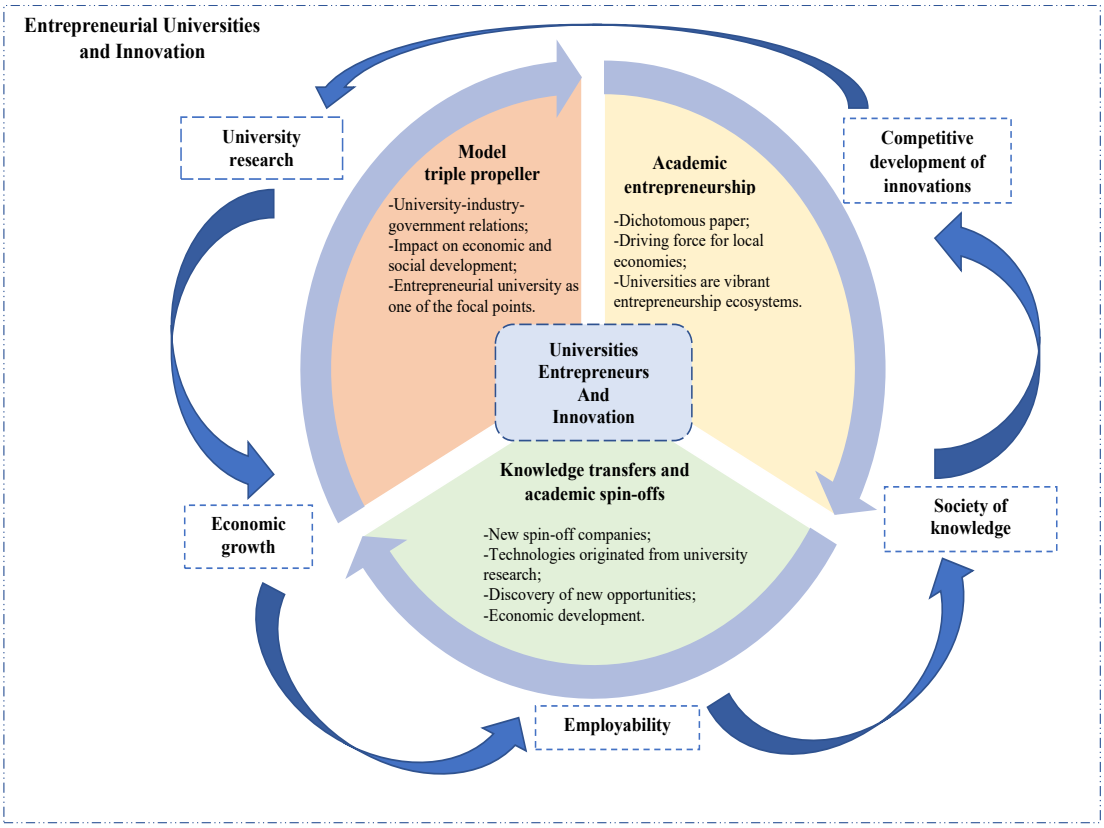


Figure 3: Framework obtained through SLR

4. Conclusion, implication, limitation and research agenda

The main objective of the study was to contribute to a systematic review of the literature, without time restrictions, to evaluate the research carried out on the relationship between entrepreneurial universities (EU) and innovation, updated to the present.

Thus, our study considered entrepreneurial universities, relating them to innovation and, concluding that innovation is a very important factor in the creation and development of entrepreneurial universities, a fact corroborated by the opinions of several authors, such as Clark (1998) and Simões et. al. (2019).

From the review carried out, it can be stated that most studies deal with three types of relationship dimensions between entrepreneurial universities and innovation: entrepreneurial universities and entrepreneurship; entrepreneurial universities, innovation and the triple helix model; and entrepreneurial universities, knowledge transfer and spin-offs.

Thus, we can say that as the world becomes more globalized and competitive, factors such as knowledge, creativity and innovation have become central to economic progress and well-being (Audretsch 2007; Paleari et al. 2015). This makes universities and higher education institutions a central actor in economic systems (Mian, 2011; Guerrero et al., 2015), because they contribute to create and disseminate new knowledge and generate human capital that are crucial for innovation and competitiveness (Urban and Guerrero, 2013) and are challenged to undertake new perspectives and approaches to provide a contribution to the development of the entrepreneurial society (Audretsch, 2014).

As such, the entrepreneurial university is now recognized as an important engine for self-development and innovation, as well as a viable response to success in highly turbulent environments and unpredictable markets (Sperrer et al., 2016).

Our systematic literature review (SLR) also makes its contribution as the time base of the analyzed articles was expanded to the present date, 2021, thus including the large number of recent articles, between the years 2019 and 2020, which evidence the growing relevance of the theme.

Therefore, from the analysis carried out, it was possible to detect some limitations of the developed study. Thus, as a limitation, we can mention that the dimension of the EU universe is very wide and that only universities from other countries were studied. Another of the limitations of the study is the fact that only one database was used to collect the literature. Finally, another relevant limitation was the choice of articles in English only, which may have ruled out studies in other languages.

In conclusion, and in line with our study, it is important to improve knowledge about entrepreneurial universities by relating them to innovation, following some of the following lines of future research (Table 2).

Table 2: Research agenda

Dimensions	Research agenda
EU and entrepreneurship	To investigate the EU's influence among university entrepreneurship teachers and students;
	Analyze the EU's relationship with entrepreneurship, in regional terms, using a sample with several universities;
	Check how entrepreneurial universities influence students' employability.
EU, innovation and triple helix model	Analyze in several EU, how these and innovation influence the triple helix model in the region;
	Analyze the EU's relationship with innovation and the triple helix model, using a sample from several universities.
EU, knowledge transfer and spin-offs	Investigate the creation of spin-offs in different EU, comparing their compositions, their contributions and their evolution;
	Analyze the EU's relationship with knowledge transfer and creation of spin-offs, using a sample from several universities.

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Entrepreneurial Orientation in Universities: A Systematic Literature Review

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Abstract: Several authors have highlighted the growing number of publications on entrepreneurial universities and have drawn academia's attention to the need for more studies focusing on entrepreneurial orientation (EO) of universities as it is an area that is still under-explored. The entrepreneurial university concept tends to be diverse and ambiguous in the literature, attracting several researchers' attention. In this sense, EO should also be increasingly integrated into the university's role. Thus, this study sought to contribute to state-of-the-art development about university EO using a systematic literature review. The aim is to analyze the literature on university EO to identify key trends in the literature, gaps in the literature and define a research agenda. The results identified three major dimensions around EO in universities: i) entrepreneurial orientation and entrepreneurial universities, ii) entrepreneurial orientation and academic spin-offs, and iii) entrepreneurial orientation and academic entrepreneurship.

Keywords: entrepreneurial orientation, university, academic spin-offs, entrepreneurial university, academic entrepreneurship

1. Introduction

Universities today are recognized for playing essential roles such as knowledge producers and disseminating institutions (Guerrero & Urbano, 2012). These serve as natural incubators that simultaneously strive to fulfill teaching, research, and business activities missions (Kirby, Guerrero, & Urbano, 2011). According to Kirby (2004), it is currently accepted that universities are an important tool to facilitate today's knowledge of the economy. In this way, the challenges proposed to universities are that they adapt to society's new needs, react faster to changes in the world, are better able to train entrepreneurs and develop employability, and, finally, that they are more effective and accountable to society (Rajhi, 2011). To overcome these challenges, universities need to evolve into a new entrepreneurial university stage (Rajhi, 2011).

Consequently, the relationship between entrepreneurial orientation (EO) and organizations has been well investigated and proven in the literature on strategic management and entrepreneurship (Miller, 2011). Concretely, EO has been extensively studied through a growing research trend in the last three decades (Balasubramanian & Yang, 2015; Kalar & Antoncic, 2015; Todorovic, McNaughton, & Guild, 2011). However, even though EO is considered one of the few examples of stabilized concepts in management science (Basso, Fayolle, & Bouchard, 2009), continue to arise questions like “What is EO?” (Covin & Lumpkin, 2011) and “Where to go from here?” (Wiklund & Shepherd, 2011). But, despite the growing awareness, little is still known about EO within universities and how this orientation can influence universities' performance (Balasubramanian & Yang, 2015; Kalar & Antoncic, 2015; Todorovic, McNaughton, & Guild, 2011).

It appears that there are several studies on the EO; however, there is still no substantial incidence of studies on the operationalization of the EO of universities. Thus, and based on the previous foundations and identifying the main gaps about EO studies in universities, the present study has the main objective to carry out a systematic review of the literature. Therefore, the article is structured as follows: after the present introduction, a state-of-the-art on EO will be carried out in universities. Then, the methodology adopted in the study is explained, and then the results of the identification of the EO will be analyzed. Finally, the conclusions and limitations of the study, with recommendations for future investigations.

2. Methodology

This investigation is based on a systematic literature review (SLR) to bring knowledge about the existing EO in the education sector, specifically in Universities.

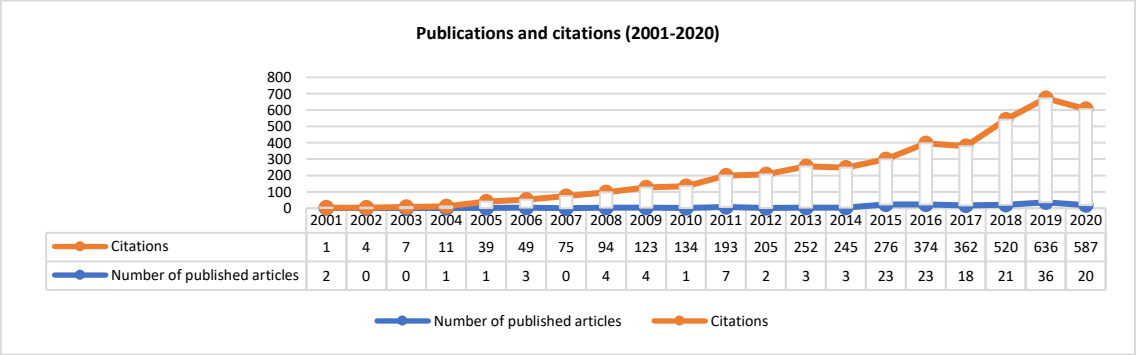
2.1 Data collection

The search for the articles was carried out using the Web of Science database. The research was conceived without time restrictions to evaluate the empirical research carried out on EO to contribute to the identification of EO in universities and contribute to the systematization of the main research areas on this theme.

Thus, in the first place, the research was carried out containing the words ("entrepreneurial orientation" and (university or "higher education"), limiting the type of documents to the articles and the category to management, business, economics, and business finance and English language. With these words in the title, we obtained 25 articles, and, in the topic, we obtained 172 articles. Thus, our analysis fell on the 172 articles.

2.2 Descriptive analysis of the data

Figure 1 shows the evolution of the number of publications and citations during the period of analysis (2001-2020), and it appears that there is a high incidence of publications found mainly in the last 5 years, with a significant relevance of publications and citations in the year of 2019 (36 articles and 636 citations).



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Citations	1	4	7	11	39	49	75	94	123	134	193	205	252	245	276	374	362	520	636	587
Number of published articles	2	0	0	1	1	3	0	4	4	1	7	2	3	3	23	23	18	21	36	20

Figure 1: Number of publications and citations (2001-2020)

Second, all abstracts were analyzed, and articles that were not empirical studies were excluded for the next phase. In this analysis, all articles related to other areas outside the investigation's scope were also excluded. While reading the abstracts, the articles were classified on a scale of: (A) relevant; (B) not very relevant; and (C) less relevant, as in the study by Lee (2009). Only articles included in categories (A) and (B) were carried over for the next phase. In a third phase, after checking the abstracts of the initial research and excluding the non-empirical and non-relevant articles, the articles were recovered in full, and it was verified which studies were truly relevant to the systematic review work. Thus, an article will only be included in the result if: i) its approach analyzes the EO; ii) it is an empirical study; and iii) its relevance is essential for the type of work to be carried out. The final sample is thus composed of 39 articles.

As for the methodologies used to identify EO in universities, there is a greater incidence of studies using the quantitative methodology, using questionnaires as research instruments (about 77% of the articles, that is, 30 articles). On the other hand, regarding data analysis techniques, we have as predominant that most studies use factor analysis (about 46% of the articles, that is, 18 articles).

Table 1 systematizes the Top 10 of the various articles selected and most cited for the study.

Table 1: Top 10 of the most cited articles included in the study

Authors	Year	Journal Name	Title of the article	Citations
Kalar & Antoncic	2015	Technovation	The entrepreneurial university, academic activities and technology and knowledge transfer in four European countries	80

Authors	Year	Journal Name	Title of the article	Citations
Lee, Lim & Pathak	2011	International Entrepreneurship and Management Journal	Culture and entrepreneurial orientation: a multi-country study	79
Todorovic, McNaughton & Guild	2011	Technovation	ENTRE-U: An entrepreneurial orientation scale for universities	68
Lim & Envick	2013	International Entrepreneurship and Management Journal	Gender and entrepreneurial orientation: a multi-country study	35
Dada & Fogg	2016	International Small Business Journal-Researching Entrepreneurship	Organizational learning, entrepreneurial orientation, and the role of university engagement in SMEs	24
Belas & Sopkova	2016	Transformations in Business & Economics	A Model of Entrepreneurial Orientation	20
Su & Sohn	2015	Asian Journal of Technology Innovation	Roles of entrepreneurial orientation and guanxi network with parent university in start-ups' performance: evidence from university spin-offs in China	12
Ismail, Anuar, Omar, Aziz, Seohod & Akhtar	2015	Proceedings of the 3rd International Conference on Leadership, Technology and Innovation Management	Entrepreneurial Intention, Entrepreneurial Orientation of Faculty and Students towards Commercialization	12
Bell	2019	Education and Training	Predicting entrepreneurial intention across the university	7
Jiang, He; Xiong, Wei & Cao, Yonghui	2017	Eurasia Journal of Mathematics Science and Technology Education	Research on the Mechanism of Entrepreneurial Education Quality, Entrepreneurial Self-efficacy and Entrepreneurial Intention in Social Sciences, Engineering and Science Education	6

Subsequently, based on the 39 selected articles, the articles included in the study were obtained by year (Figure 3). There is a high incidence of empirical studies in the last two years (2019-2020).

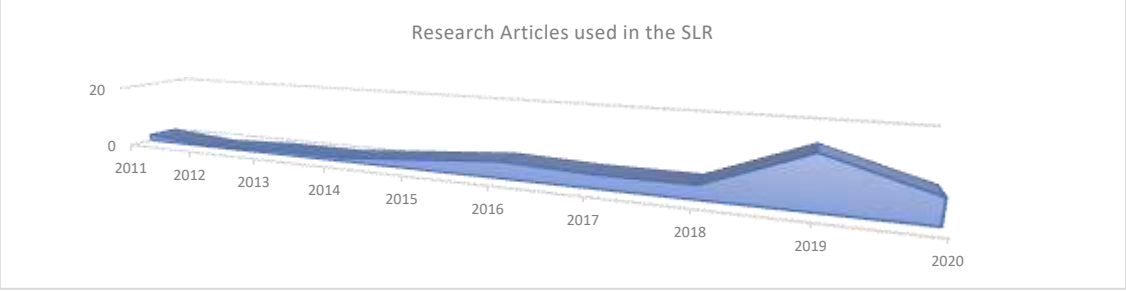


Figure 2: Research articles used in SLR per year

3. Discussion of results

Based on the articles included in the SLR, we can group them in the EO by three thematic areas (clusters), since we can see that most studies focus on the following three areas of investigation: i) the relationship of EO and spin-offs academics (41% of articles - n = 16); ii) in the relationship between EO and entrepreneurial universities

(33% of the articles - n = 13); and iii) in the relationship between EO and academic entrepreneurship (26% of the articles - n = 10).

From the analysis, we can infer that they are closely related to each other and complementarity between them.

This way, we present our clusters and then our SLR framework in the following figure (Figure 3).

3.1 Cluster 1: Entrepreneurial orientation and academic spin-offs (N = 16)

There is a growing need for universities to develop faster links between science, technology, and use and fulfill the third mission of contributing to economic development (Etzkowitz, 2002). These developments pose challenges to the university's traditional role and its practices supporting entrepreneurial activities (Lerner, 2004).

In all national economies, it is necessary to emphasize the transfer and commercialization of knowledge generated in universities (Cohen et al., 1998). In this way, as coined by Etzkowitz (1998), entrepreneurship-oriented universities prove to be keys to regional economic development.

Thus, in the context of academic entrepreneurship, the role of EO may be especially relevant since academic spin-offs, during their specific nature (Knockaert, Ucbasaran, Wright, & Clarysse, 2011), may require the development of strategies to guide their innovations commercially.

In this way, academic spin-offs often face extremely uncertain and competitive environments, in which the focus is on discovering new opportunities and the competitive development of innovations (Covin & Slevin, 1989; Rauch et al., 2009; Robertson & Chetty, 2000; Wiklund & Shepherd, 2003).

In this way, spin-offs offer a rapid evolution of the science of specific knowledge in marketable products or services (Shane, 2004). However, like other entrepreneurial companies, academic spin-offs require assistance to overcome initial resource limitations (Barney & Clark, 2007; Katila et al., 2008).

According to Pirnay and Surlemont (2003), academic spin-offs are generally initiated by individuals with scientific training, including those with substantial research experience, such as professors, assistants, researchers, PhD students (Clarysse et al., 2005), or students with less research experience (Laukkanen, 2000).

Thus, characteristics of spin-offs, such as entrepreneurial orientation, can support the long-term development of proximity to the university (Wright et al., 2007).

In conclusion, spin-offs highly oriented to entrepreneurship are prone to appreciate the emerging opportunities universities develop in their research laboratories or facilities (Mustar et al., 2006). In this way, numerous policies have been developed to support incubators at universities to encourage the development of their spin-offs (Urbano & Guerrero, 2013).

3.2 Cluster 2: Entrepreneurial orientation and entrepreneurial university (N = 13)

Hannon (2013) emphasized the challenges that a university can face to become an entrepreneur. The same author believed that an entrepreneurial university creates environments in which entrepreneurial mindsets and behaviors are developed. For Etzkowitz (2013), an entrepreneurial university tries to be more creative and effective, establishing links between education and research. Thus, over time, universities have changed their role from mere disseminators of knowledge, through teaching and research activities, to opportunities to create business due to the newly acquired EO (Heinonen & Hytti 2010; Perkmann & Walsh, 2008; Martinelli et al. 2008; Murray & Scuotto 2016).

Therefore, the entrepreneurial university tries to provide a culture and an appropriate environment to encourage academics to disseminate their knowledge through traditional academic activities and more entrepreneurial activities (Kirby et al., 2011, Philpott et al., 2011). In this way, the operationalization of innovation in an entrepreneurial university is expressed through new programs, pedagogies, creation of new ideas and projects, creation of spin-offs, new working methods, structures, and management methods (Rajhi, 2011; Silva et al., 2014; Simões et al., 2019). According to Todorovic (2007), the operationalization of taking risks

is expressed through decision-making in uncertainty and risk, with the university having a favorable attitude towards a certain risk. She makes decisions in situations of risk and decides to do things that are not known. (Rajhi, 2011). In addition, it is willing to invest a lot of money in profitable projects (Abd Latif et al., 2016).

The operationalization of proactivity in an entrepreneurial university is expressed through the university acting proactively, trying to be the first to initiate new technologies instead of reacting to competitors (Todorovic, 2007), and behaving more like a leader and less like a follower (Rajhi, 2011).

Finally, the university's operationalization is expressed through the university working hard to defeat its competitors to attract more customers, improve its brand image, and develop creative and original approaches to attract an increasingly demanding clientele, offering several opportunities (Rajhi, 2011). Thus, in conclusion, Kreiser (2011) states that the explanation for EO's positive effect on the organization's performance can be attributed to increased knowledge acquisition levels promoted through EO.

3.3 Cluster 3: Entrepreneurial orientation and academic entrepreneurship (N = 10)

The importance of the university is in its history, and it reflects its philosophy. If the university has an entrepreneurial history, its activities can be marked, to a certain extent, by an entrepreneurial spirit (Gjerding & Al, 2006). On the other hand, entrepreneurship goes hand in hand with external collaboration that allows the university to contribute to the creation and development of business and generally to society's evolution (Gjerding & Al, 2006).

According to Etzkowitz (2003), academic entrepreneurship arose from external stimuli. Thus, during the last decades, EO has become central to entrepreneurship studies' main concepts (Eduardo & Joel, 2016). At the same time, the analysis of entrepreneurship education in university education programs has attracted the interest of researchers who have assumed that the teaching of entrepreneurship can positively impact the process of creating new businesses (Katz, 1990). Balasubramanian, Yang and Tello (2020), and Miclea (2006) claim that becoming an entrepreneur seems to be the gold standard of today's dynamic universities. Thus, the entrepreneurial university results from developing an internal logic of academic development that expanded academic entrepreneurship, moving from teaching functions as the only activity to research functions aimed at companies (Etzkowitz, 2003). In conclusion, many scholars emphasize entrepreneurship's role as a single solution to the problems that constantly arise in our dynamic and rapidly changing world (Pauceanu, 2016; Gaddam, 2008).

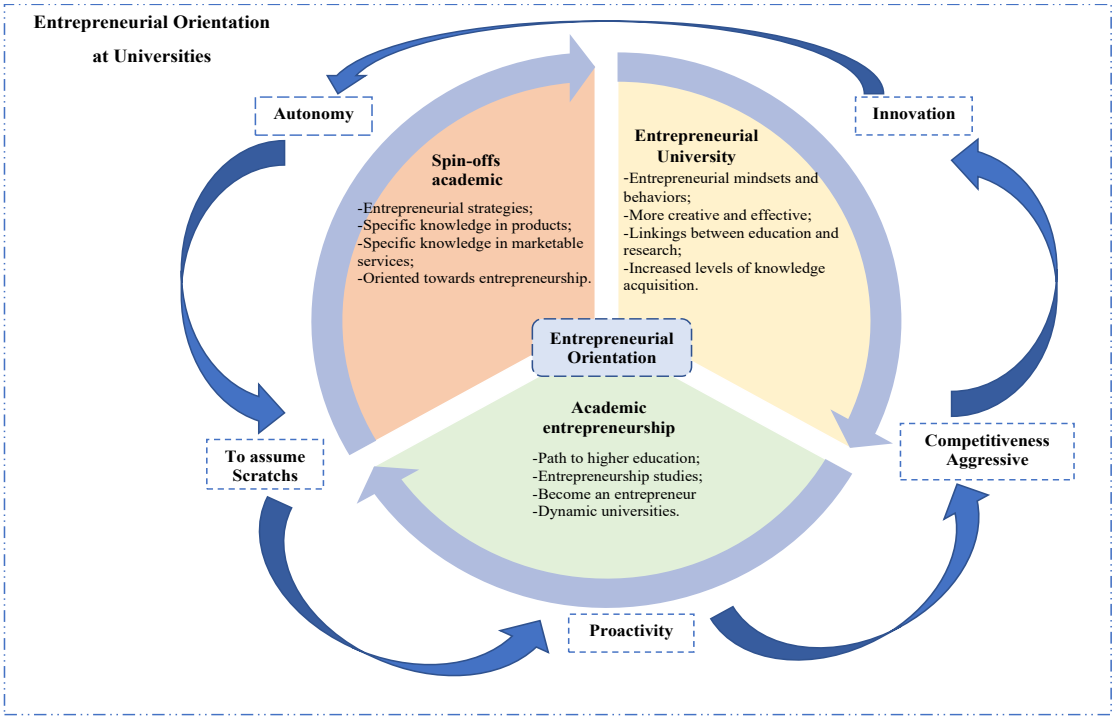


Figure 3: Framework obtained through SLR

4. Conclusion, limitation and research agenda

The review carried out shows that most studies deal with three types of thematic areas: entrepreneurial orientation and academic spin-offs; entrepreneurial orientation and entrepreneurial universities; and entrepreneurial orientation and academic entrepreneurship.

Thus, our study considered EO to create and develop entrepreneurial universities, concluding that five dimensions characterize EO in universities (innovation, autonomy, risk-taking, proactivity, and competitiveness).

As for innovation, it is a critical factor in the creation and development of entrepreneurial universities, a fact corroborated by the opinions of several authors, such as Clark (1998), Miclea (2006), and Simões et al. (2012).

Regarding proactivity, we can mention Boehm (2008), who supports the relationship between entrepreneurship development and the entrepreneurial spirit.

According to Boehm (2008), it must be autonomous for a university to be an entrepreneur. Meanwhile, for Todorovic (2007), an entrepreneurial university takes risks. As for competitiveness, it is a key factor in the creation and development of entrepreneurial universities.

Thus, for a university to become an entrepreneur, it must have an entrepreneurial orientation (Todorovic & McNaughton, 2003).

Therefore, we see EO as a force factor that helps higher institutions achieve their essential goals and become more entrepreneurial.

In our opinion, and following Etzkowitz (2003), the entrepreneurial university is a step in the university's evolution.

Therefore, from the analysis carried out, it was possible to detect some developed study limitations. Thus, as a limitation, we can mention that the EU universe's dimension is very wide and that only universities from other countries have been studied the EO. Another limitation is that only one database was used to collect the literature, and without resource to bibliometrics techniques.

As lines of future investigation, the following are suggested (Table 2).

Table 2: Research agenda

Dimensions	Research agenda
EO and entrepreneurial universities	To investigate the influence of EO among professors and students of entrepreneurship at universities;
	Analyze the relationship of EO with entrepreneurial universities, using a sample with several universities;
	Check how entrepreneurial universities influence students' employability.
EO and academic entrepreneurship	Analyze how EO influences on an individual level and how they will contribute to the creation and development of entrepreneurial universities;
	Analyze the relationship between EO and academic entrepreneurship, using a sample with several universities.
EO and academic spin-offs	Analyze how EO at the individual level influences the creation of academic spin-offs.
	Analyze EO's relationship with creating academic spin-offs, using a sample with several universities in the country.

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