Proceedings of the
16th International Conference on Intellectual Capital, Knowledge Management & Organisational Learning

Macquarie University
Sydney, Australia
5-6 December 2019

Edited by
John Dumay, James Guthrie and Rahat Munir

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ICICKM 2019

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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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Contents

ICICKM Preface

These proceedings represent the work of contributors to the 16th International Conference on Intellectual Capital, Knowledge Management & Organisational Learning (ICICKM 2019), hosted by Macquarie University, Sydney, Australia on 5-6 December 2019. The Conference Chairs are Assoc.prof John Dumay, Prof. James Guthrie and Prof. Rahat Munir, and the Programme Chair is Assoc. prof James Hazelton, all from Macquarie University, Sydney, Australia.

ICICKM is now 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 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 opening keynote presentation is given by Alexander Serenko from Lakehead University, Canada entitled: The "Dark Side of KM": Understanding the Role of Counterproductive Knowledge Behavior. In the afternoon Göran Roos, from the Economic Development Board of South Australiaon will speak on the topic of Addressing the Weakness in the Resource Based View by Adding Insights From the Intellectual Capital Field of Study. The second day of the conference will open with an address by Christian Nielsen, Aalborg University, Denmark, who will talk about The role of Intellectual Capital in Value Creation; reflections and potentials. Then an afternoon keynote will be given by James Guthrie, Macquarie University, Sydney, on the subject The past present and future of intellectual capital research.

With an initial submission of 118 abstracts, after the double blind, peer review process there are 46 Academic research papers, 2 PhD research papers, 1 Masters Research papers and 3 work-in-progress papers published in these Conference Proceedings. These papers represent research from Australia, Austria, Bahrain, Brazil, Canada, China, Cyprus, Denmark, Finland, France, Hong Kong, India, Indonesia, Italy, Japan, Jordan, Lebanon, Malaysia, New Zealand, Norway, Peru, Poland, Portugal, Russia, Slovakia, South Africa, South Korea, Thailand, UK and Vietnam.

We hope you enjoy the conference.

Assoc.prof John Dumay

Macquarie University
Sydney, Australia
December 2019

ICICKM Conference Committee

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Biographies

Conference and Programme Chairs

Assoc. prof John Dumay is Associate Professor in Accounting at Macquarie University, Sydney. John's research specialties are intellectual capital, knowledge management, non-financial reporting, management control, research methodologies and academic writing. John has published many peer reviewed articles in leading academic journals. He is also on the Editorial Board of a number of leading journals, he is the Australasian Editor of the Journal of Intellectual Capital and the Editor of Electronic Journal of Knowledge Management.

Prof. James Guthrie is a professor at Macquarie University and a fractional Professor at Bologna University. His research and teaching interests include public sector accounting, social and environmental reporting and auditing, and intellectual capital and non-financial reporting. James has published widely in international journals and is the co-editor of Accounting, Auditing and Accountability Journal.

Professor Rahat Munir is Head of the Department of Accounting and Corporate Governance, Macquarie University, Australia. With extensive experience in all forms of academic endeavours, Professor Munir offer an unbeatable track-record of excellence in curriculum development, research leadership, change management, building teams, effective human resource and financial management. Over the last three decades, he has worked on various projects, including projects funded by transnational organisations. His research interests range from performance measurement systems, CSR, corporate governance, management control systems, banking systems in emerging markets and SMEs/NFP organisations. Professor Munir has earned numerous national and international level research and teaching awards.

Assoc. prof James Hazelton is a Senior Lecturer in Accounting in the Department of Accounting and Corporate Governance at Macquarie University with interests in the areas of ethics, accounting education and sustainability. Prior to joining academia, Assoc. prof Hazelton was with PricewaterhouseCoopers, where he worked in audit and risk management consulting in Sydney, London and New York.

Keynote Speakers

Dr. Alexander Serenko is a Visiting Professor in the Faculty of Information at the University of Toronto and a Full Professor of Management Information Systems & Strategy in the Faculty of Business Administration at Lakehead University, Canada. Dr. Serenko holds a Ph.D. in Management Information Systems from McMaster University. His research interests pertain to scientometrics, knowledge management, and implicit processes. Alexander has published more than 80 articles in refereed journals, including MIS Quarterly, European Journal of Information Systems, Information & Management, Communications of the ACM, and the Journal of Knowledge Management. He has also won six Best Paper awards at Canadian and international conferences. In 2015, Dr. Serenko received the Distinguished Researcher Award which is the highest honor conferred by Lakehead University for research and scholarly activity. In 2018, he was ranked one of the most productive and influential academics in the knowledge management discipline.

Christian Nielsen, Ph.d., is Professor at Aalborg University in Denmark. He currently serves as Head of Department at the Department of Business and Management at Aalborg University. He is also the founding Editor of the Journal of Business Models as well as Editorial Board member of AAAJ and EJKM. Since initiating the establishment of the Business Design Center (BDC) in 2011, over 300 companies ranging from local start-ups and SMEs to multinationals with a global presence have seen the value of collaborating with BDC. The contributions of the research have led to published works in leading international scholarly journals.

Göran Roos is a member of the Economic Development Board of South Australia, the advisory board for Investment Attraction South Australia, METS Ignited Australia Limited's Innovation Advisory Council (MIAC), and an Invited Chair of CSIRO Manufacturing Business Unit Advisory Committee and a strategic Advisor to Defence SA and the Defence SA Advisory Board. He is Adjunct Professor at Entrepreneurship, Commercialisation and Innovation Centre, University of Adelaide; Adjunct Professor at University of Technology Sydney Business School; and Adjunct Associate Professor in the College of Business, Nanyang Business School, Nanyang Technological University, Singapore. Göran is a fellow of the Australian Academy of Technological Sciences and Engineering (ATSE) and of the Royal Swedish Academy of Engineering Sciences (IVA).

Mini Track Chair

Prof. Dr. Sağsan is the Director of the Graduate School of Social Sciences at the Near East University, Northern CYPRUS and also Editor-in-Chief of NEU Journal of Social Sciences since 2015. He is also a founding chairperson of Innovation and Knowledge Management Program at the same University. He received his Ph.D. from Başkent University, Ankara TURKEY in Management and Organization Science in 2008. His research focuses on innovation and knowledge management, organizational theories, strategic management, human resources management, e-government studies, and philosophy of social science. He published more than 100 scientific papers at the national and international level.

Biographies of Contributing Authors

Julio César Acosta-Prado is a professor of Business Administration at Universidad del Pacífico (Lima, Perú). He received his PhD in Business Management and Organization from Universidad Autónoma de Madrid in 2010. He is a professor in business administration. His main research areas are knowledge management, intellectual capital, organizational learning, and innovation management.

Caroline Akhras is an Associate at Notre Dame University. An editor and board member of peer-reviewed journals, an active practitioner-researcher in business management publishing peer-reviewed articles and attending international conferences that focus on leadership, technology, and organizational behaviour, Dr. Akhras is also dedicated to exploring innovative ways to engage MENA business students in professional development.

Geeta Albert is a Director in Knowledge Connections Inc. and a PhD candidate at Taylor's University, Kuala Lumpur, Malaysia. Her specialization is in product conceptualization and implementing digital information systems. In the last 10 years, she has turned her attention to Knowledge Management, in particular, cultivating knowledge sharing and learning in organisations.

Helena Alves is Associate Professor of marketing at the Business and Economics Department and researcher at NECE, University of Beira Interior, Portugal. Her areas of expertise include Customer Satisfaction, Services marketing, Tourism marketing and public and nonprofit marketing having authored and co-authored several articles and book chapters on this topics.

Anna Bagirova is a professor of economics and sociology at Ural Federal University, Ekaterinburg, Russia. She explores issues of human capital, labour economics and sociology of labour. She is interested in data analysis. Her research interests also include demographical processes and their determinants. She is a doctoral supervisor and a member of International Sociological Association.

Dr Ettore Bolisani is currently Associate Professor at Padova University, Vicenza, Italy. He has been Research Associate at Manchester University, visiting lecturer at Coventry University, Kaunas Technological University, Universidad Politecnica de Cartagena. He was co-Chair of ECKM 2009 and 2018. He is President of the International Association for Knowledge Management, Series co-editor of "Knowledge Management and Organisational Learning" (Springer) and editor of EJKM.

Felicjan Bylok is an Associate Professor of sociology. I am the director of the Institute of Sociology and Psychology of Management at the Faculty of Management of the Technical University of Częstochowa. My scientific interests are as follows: the sociology of consumption, the sociology of the economy, the sociology of the market, social capital and trust. The educational background of Prof. Bylok is in Sociology.

Assistant Professor **Anyanitha Distanont,** D.Sc. (Tech) received her BBA (1st Class Honours) in operations management from the Kasetsart University, Thailand in 2005, and her M.Sc in technology management from the Thammasat University in Thailand in 2008. She received her doctoral degree in the Department of Industrial Engineering and Management (DIEM) at the University of Oulu, Finland in 2013. Her research interests cover innovation and technology management, knowledge transfer, and e-Commerce.

Souâd Demigha is a Doctor in Computer Science from the University of Paris1-Sorbonne. She is a researcher at CRI (Sorbonne-University) and Lecturer at the University of Paris XI. Her Research deals with Information Systems, Medical Imaging, eLearning, Knowledge Management, Big Data and Data Mining. She is the author or co-author of 50 international scientific papers.

Dr Natalia Dneprovskaya is an associate professor of digital economy at Plekhanov Russian University of Economics. She is experienced in the development of e-learning and KM in Russian universities, an expert of UNESCO in Open Educational Resources within the higher education area. Her main research areas are the competences for knowledge and digital economy, the innovative resources for economy growth in digitalization development.

Minh Hoang Do is a lecturer of department of Investment Economics, University of Economics Ho Chi Minh city, Vietnam. He earned a master's degree in Development Economics in 2011 and a bachelor's degree in management in 2005. His main research areas include competitive advantage, entrepreneurship, value chain, and circular economy, innovation economics.

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Daniele Giampaoli is a PhD based at Department of Economics, Society and Politics (DESP) at Urbino University, Italy. His academic interests are: knowledge management, creativity, problem solving, decision making and strategic management.

Marco Giuliani is full professor of accounting at the Università Politecnica delle Marche (Ancona - Italy). His main research interests are in financial accounting, auditing, Intellectual Capital reporting and Non-financial reporting/disclosure. He is member of national and international research groups on Intellectual Capital and company valuation. He is a member of the editorial boards and of the advisory boards of several national and international journals.

Prof. Sangita Gupta is working as Professor and Head at Department of Library & Information Science, University of Jammu, Jammu. She has completed her M.Lib.I.Sc. & PhD from University of Jammu and also completed M.A in English from Punjab University. She has more than 30 years of professional experience. She has published more than 60 papers in national & international journals/conference proceedings, and 2 books/ 5 edited books. Her area of interest includes: Public Library, Library Automation, Human Resource Management, and Information Literacy.

Allam Hamdan is Professor of Accounting, Acting Dean of the College of Business and Finance, and Chairperson of the Accounting and Economics Department, Ahlia University, Bahrain. He has published papers on accounting, financial and economic issues concerning the Arab world in regional and international journals. He has interests in educational related issues in the Arab world universities.

Prof Dr Jann Hidajat is a professor of Knowledge Management and Learning Organization at School of Business and Management – Bandung Institute of Technology, Bandung Indonesia. He has been proactive in the professional academic community, and has been appointed President of Knowledge Management Society Indonesia (KMSI) since 2007. His main research are Knowledge Management, Learning Organization, Innovation, Intellectual Capital, and Human Capital Management.

Irina-Emily Hansen is a PhD candidate at Norwegian University of Science and Technology, Aalesund, Norway. Research topic "Knowledge Management of University-Industry Collaboration within the context of Open Innovation". In addition, she is teaching and supervising BSc and MSc students that have projects with industry within Lean production. Irina-Emily has engineering MSc in product and system design.

Dr. Karen Howells completed her MBA with Deakin University, and her DBA with Charles Sturt University, Australia. She is currently a lecturer in Marketing, Strategy, and Entrepreneurship at Near East University in Cyprus. After 12 years as a software engineer in the UK, Dr Howells moved to Cyprus to start her academic career, she completed her MBA with Deakin, Melbourne, and her DBA with Charles Sturt University, Australia.

Dr Karl Knox is a career academic, currently Head of Department for two departments within the University of Bedfordshire Business School, UK. His teaching and research interests focus upon research methods, Knowledge Management and the impact of change within organisations. He holds PhD, MSc and PGCE – recently being accredited with CMBE – Certified Management & Business Educator, through the Chartered Association of Business.

Lucia Kohnová graduated from the Faculty of Management in Strategic Management, Comenius University, Bratislava, Slovakia. She continued as a PhD student in the Department of Strategy and Entrepreneurship, where she devoted her research on intellectual capital and innovation of small and medium-sized enterprises.

In the field of expertise, she also deals with the balanced scorecard management system and project management.

Dr Eul-Teo Lee is a professor of department of business administration at Kunsan National University, South Korea. He earned PhD in human resources from Korea University and was a post-doctor fellow at Cornell University. His research areas are human resources in knowledge creating company and leadership. He is to be the chair of ICICKM in 2021 held in South Korea.

Natalia Mamedova gained her PhD in Economics in 2009. Currently she works as an associate Professor at the Department of information systems management and programming of the Plekhanov Russian University of Economics. Since 2010 she takes part in research projects funded by the Ministry of education of the Russian Federation, the Ministry of transport of the Russian Federation others. Area of scientific interests: methods of a KM systems, decision support, methods of information systems management. Participates in expert communities (IEEE).

Maurizio Maraglino Misciagna is a chartered accountant and adjunct professor of Innovation Economics at the University of Bari, Italy. He is specialized in business innovation. His main research areas are economics and innovative finance.

Dr Peter Massingham has a B.A., MBA., and PhD in Management (UOW). He was a management consultant with KPMG (strategy). He has published award winning papers in his field's top journals, has written a text book on knowledge management for Sage Publications, and has completed an ARC Linkage Project with Defence. He has published more than 50 peer reviewed papers.

Mahmoud Migdadi is currently teaching various subjects at the BIT Depart., Princess Sumaya University of Technology, Jordan. His area of research of interest includes KM, KMS, CRM, ERP, Innovation, E-business. He has published in *International Journal of Production Research*, *Internet Research, Computers in Human Behavior, Industrial Management & Data Systems*.

Dr Takuya Miyamoto is an associate professor of innovation management at Kurume University, Japan. He received PhD in business administration from Kobe University in 2009. He received RIBER Best Paper Prize 2018 and so on. His main research areas are disruptive innovation, network and innovation, and technology migration.

Oliver Moravcik is professor at the Faculty of Materials Science and Technology in Trnava, Slovakia. He is vice-rector of the Slovak University of Technology for strategic projects and development, and member of IEEE, IAENG, IFAC. His current area of research is applied informatics (knowledge management, technology-enhanced learning, unstructured data processing).

Mina Nasiri (MSc Tech) is a researcher and doctoral student at LUT University, School of Engineering Science, Department of Industrial Engineering and Management, Lahti, Finland. Her research interests lie in the area of digitalization, digital transformation, digital innovation, performance measurement and management, operations management and sustainable strategies.

Yuri Nefedov earned his PhD in Economics in 2002. Currently he works as an associate Professor at the Department of information systems management and programming of the Plekhanov Russian University of Economics. Areas of research: multymodelling (models chain: statistical models, ML and imitating modeling) for decision support and KM.

Duc Kim Nguyen is a lecturer in valuation, University of Economics Ho Chi Minh City, Vietnam. He is a licensed valuer and also a professional advisor of many valuation firms in Vietnam. He holds an M.Sc. in Finance, a B.A. in Audit and a B.A. in Valuation. His research areas include business and intangible asset valuation.

Dr Gary R Oliver is a Certified Practicing Accountant (CPA) with a PhD in Economics. He combines accounting, information and organisation perspectives. Gary draws on his industry experience and different strands of knowledge and knowing scholarly studies to ensure rigor and relevance in making sense of the worlds of

numbers, words, images and symbols. Important touchstones are discourse, ethnomethodology, and comparative method.

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Invited Keynote Paper

Investigating Knowledge Sabotage Behavior: The Role of Personality Traits and Co-Worker Competitiveness

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Abstract: In recent years, many academics have become concerned with not only positive knowledge behaviors, such as knowledge creation, sharing, and transfer, but also with counterproductive knowledge behaviors, including knowledge ignorance, hoarding, and hiding. The present study advances this line of inquiry by empirically investigating the phenomenon of workplace knowledge sabotage. Knowledge sabotage is an incident when an employee (i.e., the saboteur) intentionally provides wrong knowledge (information, advice, a document, or a recommendation) to another employee (the target) or intentionally conceals knowledge from another employee when the saboteur: possesses the required knowledge; knows that this knowledge is very important to the target; is fully aware of the target's critical need for this knowledge; and knows that the target would be able to productively apply the required knowledge to work-related tasks. The purpose of this study is to empirically investigate the role of personality traits and co-worker competitiveness in the context of workplace knowledge sabotage. Particularly, this study develops a knowledge sabotage measurement instrument and proposes and tests a causal model explicating the antecedents of knowledge sabotage at both individual and organizational levels. For this, data was collected from 150 employees by means of Amazon's Mechanical Turk, and the model was tested with the use of the Partial Least Squares data analysis technique. The results indicate that personality traits and co-worker competitiveness play an important role in the knowledge sabotage context. All three Dark Triad Traits – narcissism, Machiavellianism, and psychopathy – have a positive direct effect on individual knowledge sabotage behavior. Individual knowledge sabotage is also driven by organizational knowledge sabotage, defined as knowledge sabotage behavior of one's co-workers. Organizational knowledge sabotage, in turn, is impacted by organizational psychopathy and Machiavellianism. At the same time, organizational narcissism has no impact on organizational knowledge sabotage. In addition, co-worker competitiveness drives organizational knowledge sabotage behavior.

Keywords: knowledge sabotage, the Dark Triad, narcissism, psychopathy, Machiavellianism, co-worker competitiveness

1. Introduction

The success of knowledge management is almost always predicated on the assumption that knowledge is being shared effectively in the organization. This emphasis on knowledge sharing is well placed, since knowledge sharing is the primary means by which employees can tap into the collective pool of expertise that the organization has developed over time. Nevertheless, it is important to recognize that there is a set of countervailing activities that can undermine knowledge sharing — knowledge useful to others may be deliberately hoarded, hidden, or otherwise made unavailable. We call this set of activities counterproductive knowledge behaviors, and we suggest that one of its most extreme forms is the behavior of knowledge sabotage.

Serenko (2019) defines knowledge sabotage as occurring when an employee (i.e., the saboteur) intentionally provides wrong knowledge (information, advice, a document, or a recommendation) to another employee (the target) or intentionally conceals knowledge from another employee when the saboteur: possesses the required knowledge; knows that this knowledge is very important to the target; is fully aware of the target's critical need for this knowledge; and knows that the target would be able to productively apply the required knowledge to work-related tasks. The application of the wrong knowledge or a failure to apply the needed knowledge may have devastating consequences for the individual and/or the entire organization. One might assume that such behaviors are rare in the workplace, but a recent project found that over 40% of employees in the study engaged in knowledge sabotage, with many reporting that they did so repeatedly (Serenko 2019). Knowledge sabotage is a phenomenon that clearly needs our attention and further study. The purpose of this investigation is to develop and test a model that can explain the existence of knowledge sabotage in the workplace. The model focuses on the effects of personality traits at the individual and organizational levels as well as co-worker competitiveness at the organizational level.

2. Theoretical background

The previous knowledge sabotage study revealed that knowledge sabotage behavior is mostly driven by three factors: retaliation against other employees (to retaliate against a co-worker because of interpersonal conflict and the perception of interactional injustice), one's malevolent personality (to satisfy one's ego because of a general cruelty or negative attitude towards others), and gratification (to secure promotions, easier workload, monetary incentives, or other extrinsic rewards) (Serenko 2019). The present study focuses on all of these factors. Particularly, it assumes that retaliation behavior and malevolent personality can be explained by the saboteur's traits and gratification may be related to the highly competitive environment.

2.1 The Dark Triad

Among a variety of aversive personality traits, the Dark Triad, which is a constellation of subclinical narcissism, Machiavellianism, and psychopathy, represents perhaps the most extreme side of human nature (Jonason et al, 2012). The Dark Triad concept was coined by Paulhus and Williams (2002) when they theoretically and empirically justified the amalgamation of three previously documented constructs within a universal framework. They argue that as a constellation of traits, narcissism, Machiavellianism, and psychopathy "entail a socially malevolent character with behavior tendencies toward self-promotion, emotional coldness, duplicity, and aggressiveness" (Paulhus and Williams 2002, p. 556).

Narcissism reflects one's pursuit of gratification from a pervasive pattern of fantasy or behavioral grandiosity, self-idealization, and egoistic self-admiration. Narcissist employees are obsessed with their own grandiosity, self-idealization, and superiority over their fellow co-workers. First, these delusions make them believe that the formal and informal organizational rules do not apply to them (O'Boyle et al, 2012). Thus, they assume that they may cause harm to others with impunity as long as it re-establishes their distorted self-beliefs. Second, narcissists are generally dissatisfied with their current jobs (Mathieu 2013) and are likely to attribute the cause of their dissatisfaction to their co-workers and seek revenge by means of knowledge sabotage. Third, narcissists have a long memory of routine organizational conflicts which threatened their vanity, and they can spend a lot of time ruminating on the incidents and developing sophisticated and ruthless revenge strategies by any means, including knowledge sabotage.

Machiavellianism is a "strategy of social conduct that involves manipulating others for personal gain, often against the other's self-interest" (Wilson et al, 1996, p. 285). Machiavellian employees pursue their own self-interest at the expense of other workers and their entire organizations by engaging in counterproductive workplace behavior, including knowledge sabotage. First, Machiavellian traits are strongly associated with distrust (Dahling et al, 2009). As a result, Machiavellians are likely to assume that honest work effort may not pay off and they should take advantage of others and take what is 'rightfully theirs.' Machiavellian employees may also assume that their fellow co-workers may try to deceive them. They may become emotionally aroused and proactively offer wrong knowledge or withhold critical knowledge as a form of negative proactive reciprocation. Second, Machiavellians exhibit low levels of organizational citizenship behavior, especially in terms of prosocial values (Becker and O'Hair, 2007). They try to create an impression of being caring employees, but, instead, they experience negative emotions (e.g., envy) when watching other people's success which, in turn, makes them engage in knowledge sabotage to destroy their perceived competitors. Third, Machiavellians are highly manipulative (Braginsky 1970) and try to achieve their goal through political machination and the humiliation of their opponent rather than through honest effort. Knowledge sabotage may serve as an effective tool when employees choose to engage in a manipulative behavior.

Psychopathy refers to having cold, uncaring attitude and limited empathy towards other people which leads to unreasonable interpersonal aggression. Employees with psychopathic dispositions are heartless and insensitive workers who engage in antisocial and aggressive behavior towards others. Psychopaths are career-focused (Chiaburu et al, 2013) and they frequently excel in organizational recruitment and promotion due to their superficial charisma and calculative approaches to career advancement, but they can cause enormous damage to other workers and their employers (Babiak and Hare, 2006). First, they easily gain other employees' trust due to fake charm and insincere altruism. In fact, they can offer valuable knowledge to others multiple times merely to make them lower their guard and wait for a perfect moment to unleash the truly devastating potential of their dark side. Second, psychopaths may sabotage their co-workers because they enjoy watching their fellow employees suffering. Third, they disregard the conventional norms of social interaction and never help others

except for their own advancement. Fourth, they can exaggerate the magnitude of a trivial workplace conflict or difference of opinion and over-react by trying to destroy their adversary's career while enjoying watching their downfall. For this, psychopaths may use knowledge sabotage as an effective retaliation tool.

Overall, narcissists, Machiavellians, and psychopaths break the conventional norms of social exchange. Their perceptions of organizational injustice and envy dramatically amplify their negative emotions which, in turn, make them engage in knowledge sabotage against their fellow co-workers. The magnitude of knowledge sabotage is positively related to the extent of a perceived self-gratification or a threat when knowledge saboteurs believe that their ego is threatened (narcissists), they may be deprived of something of value (Machiavellians), or they have a chance to cause harm to others (psychopaths). Therefore,

> *H1: Individual narcissism has a positive direct effect on individual knowledge sabotage.*

> *H2: Individual Machiavellianism has a positive direct effect on individual knowledge sabotage.*

> *H3: Individual psychopathy has a positive direct effect on individual knowledge sabotage.*

2.2 The social contagion effect

The social contagion effect is a phenomenon when individual employees adopt the counterproductive workplace behavior of their fellow co-workers (Liang et al, 2018). It is grounded in strong empirical evidence confirming that the aggregate level of counterproductive workplace behavior is related to the counterproductive actions of individual employees (Glomb 2010) because the victims frequently replicate the negative perpetrators' behavior to harm others (Lee et al, 2016). This study hypothesizes that co-workers' knowledge sabotage behavior has an impact on individual employees (Robinson et al, 2014) making them, in turn, engage in knowledge sabotage. In other words, other workers' knowledge sabotage behavior has a contagion effect on individual employees. The manifestation of this contagion effect may be explicated from the perspective of affective events theory.

Evidence suggests that counterproductive workplace behavior is driven by negative emotions (Michalak et al, 2019). Affective events theory further posits that organizational events resulting from counterproductive workers' actions facilitate the development of negative affect-driven attitudes and behaviors of their victims (Weiss and Beal, 2005). Particularly salient and impactful are emotionally-charged inter-personal workplace conflicts because these trigger adverse affective reactions and may require reciprocal retaliation by any means (Hongbo et al, 2019), including knowledge sabotage. Thus, those who perceive themselves as being victims of knowledge sabotage may fall into extremely negative affective states and channel their anger towards the alleged perpetrator or others by reciprocally engaging in knowledge sabotage. Thus,

> *H4: Organizational knowledge sabotage has a positive direct effect on individual knowledge sabotage.*

2.3 The organizational-level factors

Hypotheses H1-H3 focused on the impact of personality traits on knowledge sabotage on the individual level. In addition, it is critical to understand whether the same phenomenon takes place on the organizational level by employing a set of collective constructs. The collective constructs employed in the present study ascribe the Dark Triad personality traits to collective organizational entities – to the other employees in one's organization.

It is hypothesized that the Dark Triad traits (Paulhus and Williams, 2002) – narcissism, Machiavellianism, and psychopathy – of other employees facilitate their engagement in knowledge sabotage on the organizational level. The rationale is similar to the one used to justify H1-H3 – employees possessing the Dark Triad personality traits differ from those who lack these characteristics because they are driven by extreme negative emotions, ignore social rules, attribute their negative emotions to others, continuously ruminate on their negative work experiences, distrust their colleagues, ignore prosocial values, enjoy manipulating, humiliating, and tormenting others, exhibit insincere altruism, and exaggerate the magnitude of trivial disagreements. For them, knowledge sabotage represents an effective mechanism to pursue their dark goals. Thus,

> *H5: Organizational narcissism has a positive direct effect on organizational knowledge sabotage.*

> *H6: Organizational Machiavellianism has a positive direct effect on organizational knowledge sabotage.*

> *H7: Organizational psychopathy has a positive direct effect on organizational knowledge sabotage.*

Organizations often facilitate and even encourage co-worker competitiveness, defined as inter-employee competition for a limited pool of tangible or intangible valuable resources and rewards (Brown et al, 1998). This happens because first, management creates structural competition by developing a win/lose framework based on mutually exclusive goal attainment where one's success requires another's failure. Second, organizations often develop hiring and retention policies favoring those with extremely competitive attitudes. Whereas this strategy may bring short-term benefits, it eventually fails because it ruptures inter-employee relationships. In a highly competitive work environment, even the most conscientious employees may engage in questionable, unethical, and even illegal practices when placed under extreme pressure, for example, when they risk failing a probation because only a select few top performers are expected to pass.

The functioning of competitive environments contradicts the very principles of inter-employee knowledge exchange when individuals are expected to altruistically help one another without expecting any direct benefits (Serenko and Bontis, 2016). Over-reliance on various forms of tangible and intangible rewards reduces employees' intrinsic motivation to share knowledge and, instead, may lead to knowledge sabotage. Thus,

H8: Co-worker competitiveness has a positive direct effect on organizational knowledge sabotage.

Figure 1 presents the proposed model.
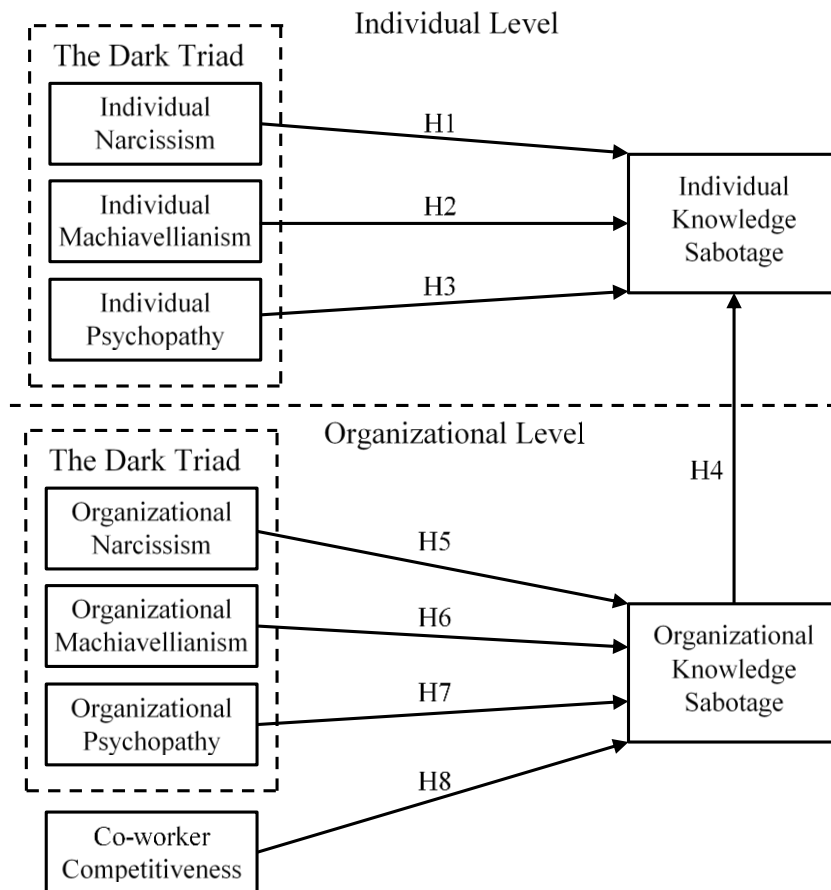
Figure 1: The proposed model

3. Methodology

A short 12-item Dark Triad scale by Jonason and Webster (2010) was used to measure narcissism, Machiavellianism, and psychopathy on the individual level. To measure them on the organizational level, the referent shift approach was employed by changing the referent for the conceptual definition and operationalization of the construct. For this, instead of answering the question with respect to yourself (e.g., I tend to lack remorse), respondents were asked to reflect on their workplace colleagues (e.g., My colleagues tend to lack remorse). This method is frequently employed in management research to assess variables at different

levels (Chan 1998). The original Fletcher and Nusbaum's (2010) scale was used to measure co-worker competitiveness.

The knowledge sabotage constructs were operationalized in short and long forms. In the previous knowledge sabotage study (Serenko 2019), four distinct scenarios were developed, one for each type of knowledge sabotage. To develop a long scale, three questions were developed for each situation. For individual knowledge sabotage, the questions pertained to the respondent's behavior whereas for organizational knowledge sabotage, the questions focused on his/her colleagues' behavior (the referent shift approach (Chan 1998)). There were eight situations accompanied by three questions each – 24 questions in total.

To create a short scale, a concise definition of knowledge sabotage was developed, and each construct was operationalized with four questions (i.e., four for individual and four for organizational knowledge sabotage, eight questions in total). Instructions emphasized the importance of answering all questions in the context of one's current workplace (the instrument is available at http://www.aserenko.com/ICICKM2019Appendix.pdf).

Participants were recruited from the Amazon's Mechanical Turk (mTurk). mTurk is the largest online marketplace which employs up to half-a-million workers who are ready to perform various human intelligence tasks (HITs) including participation in scholarly research. The following mTurk built-in screening criteria were used for participant recruitment: country of residence – USA; HIT approval rate = 98%; and the number of previous HITs approved > 5,000. Only those who were employed full-time for at least two years in an organization that had 10 full-time employees or more were allowed to participate in the study. For the full completion of the questionnaire, the respondents were offered a monetary incentive of $2.00 US. Two versions of the instrument were developed and randomly administered where individual and organizational items were presented in different sequences. After rejecting three poor-quality surveys, 150 valid responses were retained for analysis.

4. Results

The respondents had been employed in their current organization for 6.4 years, on average, ranging from 2 to 40 years. Their organizations varied in terms of their size (employing from 10 to over 100,000 people). 46% of the respondents were women. Their average age was 37, ranging from 21 to 64 years old. They had 16 years of full-time work experience, on average, ranging from 2 to 44. There were no differences in the means of the short and long knowledge sabotage scales ($p > 0.1$). Table 1 summarizes the means of the knowledge sabotage and the Dark Triad constructs and shows that the respondents rate their workplace colleagues higher on these negative measures than they rate themselves ($p < 0.01$).

Table 1: Construct means – knowledge sabotage and the Dark Triad

	KS-Short	KS-Long	NAR	MAC	PSY
Organizational Level (co-workers)	2.21	2.23	4.24	3.27	2.84
Individual Level (myself)	1.53	1.71	2.99	2.26	2.33

Scales: KS – knowledge sabotage; NAR – narcissism; MAC –Machiavellianism; PSY – psychopathy.

SmartPLS version 2.0 was employed for further analysis. Two measurement and structural models were independently estimated: one with the short knowledge sabotage scale and another with the long knowledge sabotage scale. Both the short and long scales of individual and organizational knowledge sabotage exhibited excellent levels of reliability with very high values of item-to-total correlation, Cronbach's Alpha, loadings, composite reliability, and average variance extracted (AVE). Most of the Dark Triad items (narcissism, Machiavellianism, psychopathy) were also reliable. The loadings of several Dark Triad items were below a recommended threshold of 0.7 for excellent items, but they were retained to ensure content validity of the scale. The co-worker competitiveness scale was also found to be very reliable. All of the loadings were significant at the 0.01 level. Construct correlations reveal that the square root of the AVE exceeds the inter-construct correlations which confirms discriminant validity of all measures (see Tables 2 and 3). Figure 2 presents the structural models for the short and long forms of knowledge sabotage scales. Bootstrapping was used to estimate the statistical significance of the proposed relationships. Seven hypotheses were supported and one was rejected. Both models were very consistent in terms of their structural relationships.

Table 2: Construct correlations – the short scale (note: the diagonal elements are the square root of the AVE of a respective construct)

	OKS	IKS	ONAR	INAR	OMAC	IMAC	OPSY	IPSY	CCOMP
OKS	**0.930**								
IKS	0.676	**0.911**							
ONAR	0.458	0.137	**0.813**						
INAR	0.302	0.482	0.338	**0.767**					
OMAC	0.672	0.469	0.594	0.268	**0.856**				
IMAC	0.413	0.638	0.184	0.558	0.445	**0.812**			
OPSY	0.699	0.488	0.514	0.183	0.809	0.348	**0.881**		
IPSY	0.323	0.575	0.138	0.325	0.439	0.715	0.395	**0.844**	
CCOMP	0.445	0.335	0.603	0.366	0.476	0.252	0.472	0.210	**0.930**

Table 3: Construct correlations – the long scale (note: the diagonal elements are the square root of the AVE of a respective construct)

	OKS	IKS	ONAR	INAR	OMAC	IMAC	OPSY	IPSY	CCOMP
OKS	**0.975**								
IKS	0.729	**0.978**							
ONAR	0.411	0.146	**0.940**						
INAR	0.333	0.482	0.336	**0.920**					
OMAC	0.655	0.455	0.604	0.272	**0.957**				
IMAC	0.416	0.652	0.186	0.563	0.441	**0.939**			
OPSY	0.682	0.458	0.521	0.188	0.807	0.348	**0.966**		
IPSY	0.375	0.649	0.144	0.335	0.437	0.719	0.397	**0.952**	
CCOMP	0.421	0.304	0.606	0.372	0.476	0.251	0.469	0.211	**0.980**
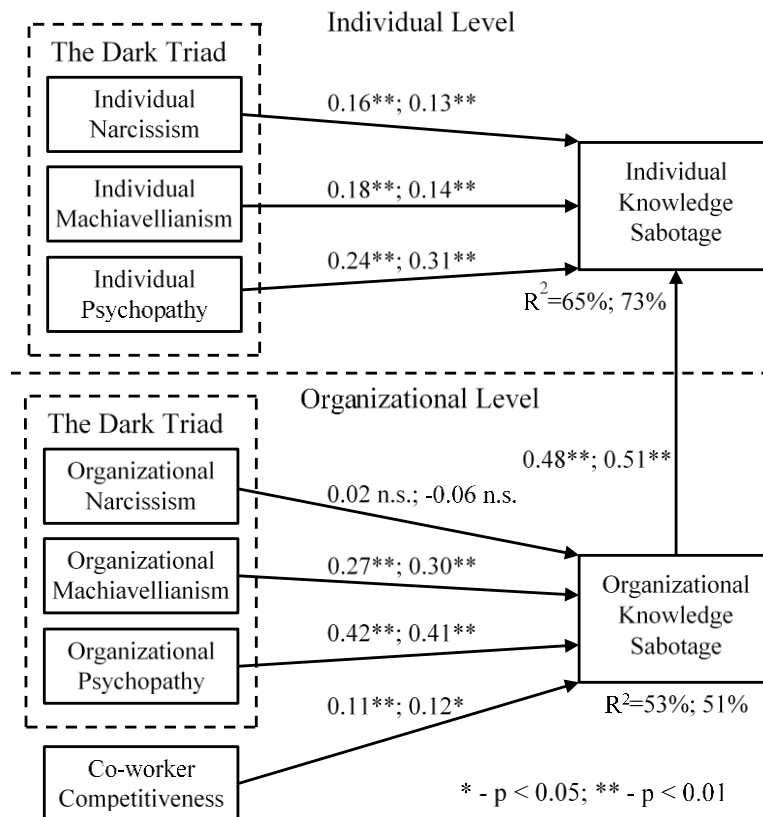
Figure 2: The structural model (betas and R-squared – the short knowledge sabotage scale; the long knowledge sabotage scale)

5. Discussion

5.1 Theoretical implications

First, the results of this study show that the personality traits of narcissism, Machiavellianism, and psychopathy are significant predictors of individual knowledge sabotage behavior. In isolation from other constructs, these traits collectively explain around 50% of the variance in individual knowledge sabotage behaviour observed in the study. This is an interesting result, as it establishes an important relationship between personality traits and counterproductive knowledge behavior, a relationship that has hitherto received little attention in the knowledge management literature. Second, it was found that individuals under-estimate their negative behavior and traits, and/or overestimate those of their fellow co-workers. Recall that Table 1 indicates that the means of organizational knowledge sabotage and the Dark Triad constructs are higher than those of individual ones ($p < 0.01$) which implies that, on average, employees rate their co-workers' negative trait and behaviors higher than they rate themselves.

Third, one of this study's interesting finding is the relatively strong link between organizational and individual knowledge sabotage behavior. This relationship implies that when individual employees form the perception that others in the organization engage in knowledge sabotage, they themselves are more likely to behave in a similar manner. More generally, we may infer that when employees form the (perhaps mistaken) belief that knowledge sabotage is common, acceptable, or even the norm in the organization, they are more likely to engage in knowledge sabotage. Earlier in the paper, we discuss how the social contagion effect could be an explanation for this tendency: when employees perceive that knowledge sabotage is prevalent or acceptable among others in the organization, they "reciprocate" and become more disposed to engaging in that form of behavior.

Fourth, among the personality traits tested in this study, psychopathy emerged as the strongest predictor of knowledge sabotage behavior. Employees exhibiting psychopathy symptoms constitute a tiny fraction of the entire workforce, but they are responsible for a vast majority of internal conflicts and, as the present study demonstrates, also for knowledge sabotage incidents. As such, corporate psychopaths express their antisocial behavior by engaging in knowledge sabotage as a means to undermine their fellow co-workers. Fifth, despite a leading role of psychopathy in the context of organizational knowledge sabotage, the importance of the other two Dark Triad traits – narcissism and Machiavellianism – should not be ignored.

Sixth, as expected, co-worker competitiveness is linked to the perception that colleagues may engage in knowledge behavior that sabotages the performance or professional success of the individual. While the relationship is significant, its effect is relatively modest when compared with that of organizational psychopathy and organizational Machiavellianism. Last, both the long and short versions of the knowledge sabotage scale employed in this study exhibited good psychometric properties and generated very comparable structural models. Despite some minor differences, the conclusions reached by analyzing the models based on the long and short scales are identical. However, the short version of the instrument places a lower cognitive load on respondents and requires less time to complete. Thus, future scholars are advised to employ the short version of the knowledge sabotage scale.

5.2 Practical recommendations

First, organizations should help their employees to be able to objectively re-evaluate their own traits and knowledge behavior as well as those of their colleagues in order to ensure that their reciprocating knowledge behavior is more aligned with the reality in their organization. For this, organizations may offer formal and informal training sessions on the existence and impact of cognitive biases. They can also ask their employees to rely on objective measures, for example, count the number of knowledge sabotage incidents that they caused and experienced, in order to form a more valid measure. Second, managers are recommended to look out for an undesirable scenario when employees somehow form the belief that counterproductive knowledge behavior is common practice in the organization when that is in fact not the case. For this, they may include knowledge sabotage measures in their periodic employee surveys. Note, however, that even a small rate of knowledge sabotage incidents is alarming because, as the previous knowledge sabotage study reveals (Serenko 2019), the consequences of knowledge sabotage may be truly devastating for both individual employees and their organizations.

Third, managers and leaders need to understand and take into account the possibility that the personality traits could predispose certain individuals to engage in an extremely harmful counterproductive knowledge behavior. If knowledge sabotage behavior tends to be persistent over time, the best course of action for organizations may be to take steps to ensure that individuals with these traits are not hired in the first place or are identified during their probation periods as potential new hires. For in-service employees, organizations might do well to introduce training or communication programs that emphasize the importance of ethical behavior, and the need for collegiality and a shared sense of responsibility.

6. Conclusion

This study draws our attention to knowledge sabotage as an extreme form of counterproductive knowledge behavior. Knowledge sabotage is particularly pernicious as it penalizes not only the employees and the organization, but also the customers that the organization serves. We constructed and tested a model that is able to explain the existence of knowledge sabotage based on individual personality traits that form the Dark Triad, and the extent of co-worker competitiveness in the organization. Our analysis found that all three personality traits of narcissism, Machiavellianism, and psychopathy are significant predictors of individual knowledge sabotage behavior, with psychopathy being the most important factor. Co-worker competitiveness is linked to the perception that colleagues engage in knowledge sabotage which in turn has a positive direct effect on individual knowledge sabotage. This last relationship between organizational and individual knowledge sabotage is interesting: it suggests that when individuals form the belief (whether accurate or not) that others in the organization engage in knowledge sabotage, they become more likely to do so themselves. More generally, the study concludes that knowledge sabotage behavior can be explained by the perpetrator's personality traits, their perception that knowledge sabotage is common in the organization, and the extent of co-worker competitiveness.

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Academic Research Papers

Organizational Ambidexterity, Intangible Assets and Economic Results in new Technology-Based Firms

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Abstract: This paper analyses organizational ambidexterity and its effects on obtaining intangible assets and the results obtained by the economic evolution reached in new technology-based firms (NTBFs), with high degree of complexity and rapid generation of knowledge in a dynamic though uncertain environment. Exploration involves both innovation as generation of new ideas, and exploitation refers use of available resources and involves technological improvement. Although these two processes are essential in the entrepreneurial process, it is also true that they compete for scarce resources. Maintaining a balance between exploitation and exploration is a basic condition for survival and competitive success. Therefore, organizational ambidexterity describes the alignment of the processes of exploration and exploitation, of the exchange between environmental stimuli and the knowledge that exists in the organization and the activities carried out by its members. The study was conducted on 102 NTBFs located in business incubators and technology parks in Colombia. The assessment of intangible assets consists of discerning whether the development of innovation capability processes is a source of economic result obtainment. The intangibles assets submitted to study are related to customer satisfaction, increase in number of customers, satisfaction of the employees, increase in the level of quality of products and services, continuous improvement of products and services, and external recognition of the firm. The instrument contains 19 items related to the three constructs measured using a five-point Likert scale ranging from 1 to 5. The three Likert scales were subjected to an Exploratory and Confirmatory Factorial Analysis, finding a one-dimensional structure for the three variables. In addition, the three constructs showed adequate levels of reliability. The proposed model indicated a good fit. The results deriving from Structural Equation Modeling (SEM) enable us to corroborate that proper management of the processes associated with innovation capability —in this case the organizational ambidexterity— favours directly the attainment of intangible assets (explaining 58% of their variability) and thus influencing the results of the economic evolution (explaining 20% of the variance).

Keywords: organizational ambidexterity, innovation capability, intangible assets, economic results, new technology-based firms

1. Introduction

The new business dynamics requires agility and effectiveness to adequately respond to unexpected changes experienced within the market scope, as well as extenuating effects, which guarantee the sustainability of firms in the medium to long term. Therefore, organizations should focus their efforts on strengthening its innovation capability processes at all levels (Deng-Neng and Ting-Peng, 2011).

Exploration involving innovation and exploitation results in the improvement of available technology. While these two processes are essential for organizations, it is also true that they compete for scarce resources (Peteraf, 1993). Maintaining a balance between the two is a basic condition for survival and competitive success (March, 1991; Levinthal and March, 1993). Therefore, organizational ambidexterity assists in maintaining a simultaneous development of both exploration and exploitation, which the firm must obtain in order to facilitate innovation (He and Wong, 2004; Jansen, Simsek and Cao, 2012).

In this way, organizational ambidexterity is configured as a key element for obtaining economic results and intangible assets, due to its dynamic capabilities that allow a firm to adapt, integrate and configure both the resource pool and organizational skills to help cope with the changing environments and generate new ways of getting results (Benner and Tushman, 2003; Teece, Pisano and Shuen, 1997).

Based on the above, the objective of the study is to analyse the effects of organizational ambidexterity in obtaining intangible assets and the results of the economic evolution in NTBFs. This objective helps to establish the following research guidelines: What intangible assets are generated from the NTBFs organizational ambidexterity? What results of the economic evolution are favoured by the direct influence of the intangible assets and which ones benefit from the indirect influence of the organizational ambidexterity?

2. Theoretical foundations and hypothesis

2.1 Organizational ambidexterity

The innovation capability is the ability of the knowledge-intensive firm to mobilize and manage those scientific and technical resources (Nonaka and Takeuchi, 1995; Subramaniam and Youndt, 2005), through processes of exploration, exploitation, and organizational ambidexterity (Cohen and Levinthal, 1990; Teece, 2009), which allow the development of ideas, processes or products with success for the implementation of competitive strategies generating higher business results in conditions of rapid change and uncertainty of the environment (Furman, Porter and Stern, 2002; Helfat and Raubistchek, 2000).

Based on the contributions of March (1991) and Levinthal and March (1993), the processes of innovation capability have been classified according to the nature of knowledge flows, making a distinction between exploitation (responsible for obtaining successive innovatory incremental improvements to some of its attributes until obtaining the anticipated change to a new technological regime), exploration (responsible for obtaining radical innovations, which become dominant technological designs for a certain period of time), as well as the simultaneous development of both processes.

Therefore, exploration and exploitation processes emphasize the organizational ambidexterity, according to the degree of novelty of the innovation, the risk assumed in those processes and the possible application in the markets, more or less immediate (Crossan and Hurst, 2006; Grant, 2002; Simsek et al, 2009).

According to Tushman and O'Reilly (1996) an organization is ambidextrous when it can compete in mature markets (cost, efficiency and important incremental innovation) and develop new products and services for emerging markets (where experimentation, speed and flexibility are essential). In this case, the firms that are capable of developing simultaneous processes to explore and exploit, achieves superior performance (Bernal and Toro-Jaramillo, 2018).

2.2 Intangible assets

The measures or indicators identified results of simultaneous processes (exploitation and exploration) defined as organizational ambidexterity are: customer satisfaction, and increase in number of customers (Cegarra-Navarro and Dewhurst, 2007); satisfaction of the employees; increase in the level of quality of products and services (Prieto, 2003); continuous improvement of products and services (Lai and Shue, 2005); and external recognition of the firm (Cegarra-Navarro and Dewhurst, 2007; Prieto, 2003).

2.3 Results of the economic evolution

In terms of results of the economic evolution, the measures are: growth of sales (Lubatkin et al, 2006); net profit growth (Uotila et al, 2009); profitability (Han and Celly, 2008); productivity (Prieto, 2003), and improvement of production costs (Morgan and Berthon, 2008).

2.4 Relationship between the organizational ambidexterity, intangible assets and results of the economic evolution

The processes of exploration and exploitation, and their alignment as a result of organizational ambidexterity are processes of exchange between the stimuli of the environment, the knowledge that exists in the organization and the actions of its members, where those knowledge and actions are input and output of conversion flows and change in knowledge stocks (Raisch and Birkinshaw, 2008; Rothaermel and Alexandre, 2009). This reflection leads us to a new approach or perspective of innovation capability and to conceive it as the dynamic potential of creation, assimilation, diffusion, and use of knowledge through flows that make possible the formation and evaluation of knowledge stocks, which enable the organization and the people that integrate it to act in changing environments (Acosta-Prado and Fischer, 2013; Bontis, 1999).

The valuation of the business results consists of evaluating whether the innovation capability, through the process of organizational ambidexterity, constitutes a true means of obtaining superior results (Gibson and Birkinshaw, 2004). Based on the previous arguments, the organizational ambidexterity plays an essential role through its dynamic function (Petro et al, 2019). The latter is responsible for supporting up its financial activity

and providing the firm with the resources and routines to generate value: both directly in primary activities and indirectly ensuring the reliability and competitiveness of products and services (Zack, 1999). That is to say, the adequate management of the processes associated with the organizational ambidexterity could directly favour the obtaining of intangible assets, and, indirectly facilitate the results of the economic evolution.

According to the references mentioned in the literature, there is currently no consensus regarding the intangible assets that are favoured by the organizational ambidexterity, as well as to what extent this process of innovation capability influences the obtaining of results deriving from the economic evolution. The present study tries to make advancements on these issues; more specifically, it analyses the relationship between organizational ambidexterity, intangible assets and the results of the economic evolution, being the case that the first influences the other two. The foregoing leads us to propose the following hypothesis to be tested empirically:

> *H1. Organizational ambidexterity as innovation capability process allows the generation of intangible assets linked to customer satisfaction, increase in number of customers, satisfaction of the employees, increase in the level of quality of products and services, continuous improvement of products and services, and external recognition of the firm.*

> *H2. The relationship between organizational ambidexterity and intangible assets favours the obtaining of results deriving from the economic evolution expressed in sales, net profit, profitability, productivity and improvement of production costs.*

3. Methodology

To attain the research objective, the above stated hypothesis has been contrasted in new technology-based firms (NTBFs) from Colombia that were considered adequate for empirical contrasting for several reasons. They are newly created firms immersed in the process of building up their foundation strategies, which is not the case of bigger, more solidly-established organizations. These new firms are easier to gain access to and assume the necessity to reflect their aim strategies on their management and learning processes, as well as on the capabilities they must develop to attain success.

3.1 Participants

The sample consists of 102 NTBFs, located in incubators and Science and Technology Parks of Colombia. Among the sectors in which they are found, we have selected the following: Information and Communication Technologies (ICT) and electronics; environment and renewable energies; biological and health sciences, biotechnology and chemistry; nanotechnology, new materials and engineering, and the creative industry. These NTBFs are micro-enterprises -with fewer than 10 staff members- or small firms -with fewer than 50 staff members-, based on the exploitation of an invention or a technological innovation (Little, 1997). The data of NTBFs were obtained from business incubators directories and technology parks linked to the Colombian Network of Technology Parks, Incubators and Innovation Territories, available online in November 2018.

3.2 Instrument

The instrument contains 19 items divided in two parts. The first part explores the general information of the firm. In the second part, each item was measured using a five-point Likert scale (Likert, 1932). In the first and second section (second part) there have been used response options ranging from 1 to 5 (Never, Little, Sometimes, Several times and Very often). In this sense, the first section evaluates the organizational ambidexterity with 6 items. The second section measures the intangible assets with 8 items. The third section measures the results of the economic evolution through 5 items, using a five-point scale, ranging from 1 to 5 (very negative evolution [-10 to -20%], negative evolution [-1 to -9%], stable, positive evolution [1 to 9%] and very positive evolution [10 to 20%]).

3.3 Procedure

The instrument was applied by email to the NTBFs founding-promoter partners and executives, with the prior authorization of the executives of business incubators and science and technology parks. The responses were obtained from 102 NTBFs tested with the scale formulated.

3.4 Data analysis

The analysis was executed using R Statistics software, version 3.6.0 (R Core Team, 2019). We worked with the base package and tidyverse (Wickham, 2017), psych (Revelle, 2018) and lavaan (Rosseel, 2012) packages. The analysis consisted of three phases. Firstly, validity evidence based on the internal structure of the scale was collected, using the Exploratory Factor Analysis (EFA), and the Confirmatory Factor Analysis (CFA) (American Educational Research Association, American Psychological Association and National Council on Measurement in Education, 2014).

For the EFA, the adequacy of the Pearson correlation matrix was analysed using the Kaiser-Meyer-Olkin or KMO index (Kaiser, 1974) and Bartlett's Sphericity Test (Bartlett, 1950). The Unweighted Least Squares (ULS) was used as method of factor extraction. As criteria for the retention of factors were used the Kaiser-Gutman rule (eigenvalues greater than 1), scree test (Cattell, 1966) and parallel analysis (Horn, 1965). Likewise, for intangible assets, Oblimin oblique rotation was used because the factors are highly interrelated.

CFA was used through the Weighted Least Squares Means and Variance adjusted (WLSMV) estimation method with robust standard errors and SS (Scaling-Shifted) scaled statistical test. In order to assess the fit of the model we considered several indexes: the ratio between adjusted chi-square and degrees of freedom (SSχ^2/df), taking as adequate values less than 2; Comparative Fit Index (CFI), considered adequate superior to .90 (Keith, 2019); Tucker-Lewis Index (TLI), above .90 indicate a good fit (Keith, 2019; Schumacker y Lomax, 2016); Root Mean Square Error of Approximation (RMSEA), with values below .08 as indicative of acceptable model fit (Keith, 2019; Schumacker y Lomax, 2016), Standardized Root Mean Square Residual (SRMR), values lees than .08 suggest good model fit (Hu and Bentler, 1999; Keith, 2019).

In a second phase, the internal consistency reliability was estimated using the omega coefficient (McDonald, 1999). For the interpretation of reliability, the levels proposed by George and Mallery (2013) were considered.

Finally, the third phase to validate the explanatory model of results derived from the economic evolution and intangible assets from the evaluation of the organizational ambidexterity, Structural Equation Modeling (SEM) was used. The verification of the adjustment of the propose model was similar to that indicated in CFA (Jöreskog and Sörbom, 1986).

4. Results

4.1 Exploratory Factor Analysis (EFA)

Regarding the organizational ambidexterity, the index of sampling adequacy was meritorious (KMO = .87). The Bartlett's Sphericity Test presented that the correlation matrix was adequate for the factor analysis, χ^2(15) = 344.53, p < .001. On the other hand, the three methods for selecting the number of factors, suggested the extraction of a factor. The extracted factor explained 61% of the variance. Also, the factor loadings were found between .66 and .82.

In the EFA for intangible assets, the sampling adequacy analysis was meritorious (KMO = .87). In addition, Bartlett's Sphericity Test was statistically significant, χ^2(28) = 380.82, p <.001. For the determination of the number of factors to be retained, the three methods coincided in extracting two factors. Factor 1 explained 43% of the variance and was characterized as performance Perception. Factor 2 explained 13% of the variance and was called recognition perception. The total variance explained by the factors was 56%. The factor loadings varied between .47 and .91. Additionally, the correlation between the factors was .40.

Finally, an EFA was carried out for results of the economic evolution. The sample adequacy analysis was meritorious (KMO = .85). Bartlett's Sphericity Test was statistically significant, χ^2(10) = 477.11, p <.001. For the determination of the number of factors to be retained, the three methods coincided in extracting a factor, which explained 76% of the total variance. The factor loadings varied between .78 and .91.

4.2 Confirmatory Factor Analysis (CFA)

CFA for the 6-items unifactor structure of the organizational ambidexterity indicated an adequate fit ($SS\chi^2$ = 14.04, *df* = 9, $SS\chi^2/df$ = 1.56, RMSEA = .074, SRMR = .034, CFI = .957 and TLI = .928). Likewise, all factor loadings were statistically significant (Figure 1).
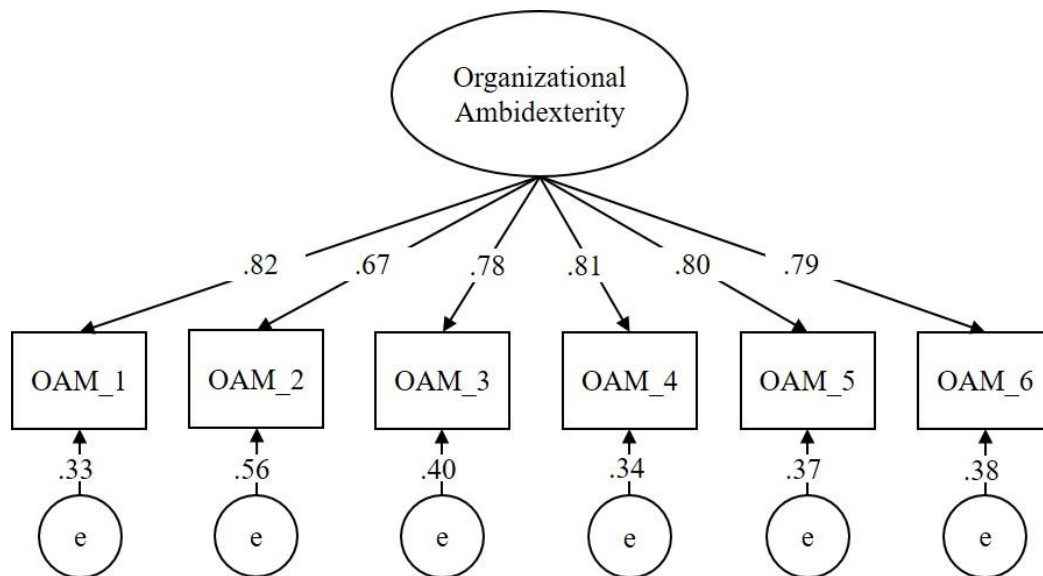
Figure 1: CFA of the organizational ambidexterity with standardized estimates

In relation to intangible assets (Table 1), the first CFA model based on the theoretical formulation of the instrument, a factor with 8 items (INT_1 to INT_8). Model 2 was built on the basis of model 1, where items INT_5, INT_7 and INT_8 were eliminated because their factor loadings were less than .50. Model 3 was constructed from the structure obtained in the EFA. On the basis of model 3, model 4 was built, where item INT_7 was deleted because it presented a negative variance, nevertheless, item INT_5 presented a factor loading less than .50. Model 2 showed the best indices (Figure 2).
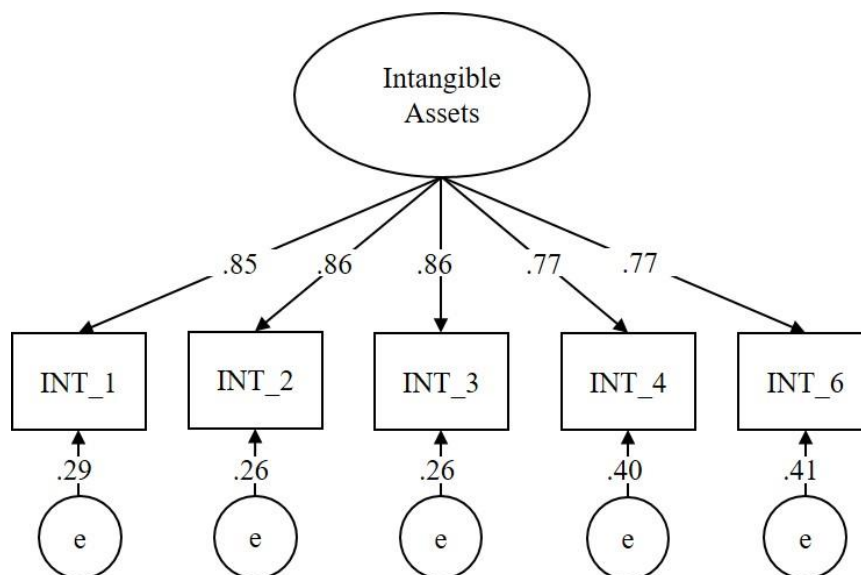
Figure 2: CFA model 2 of the intangible assets with standardized estimates

Finally, in CFA for the results of the economic evolution (Table 1), the first model was designed based on the theoretical formulation of the scale, a factor with 5 items. Model 2 was built on the basis of model 1, adding the correlation between the errors of items REE_3 and REE_4. Model 3 was constructed from the previous model, adding the correlation between the errors of the items REE_4 and REE_5. This model presented the best adjustment indices (Figure 3).
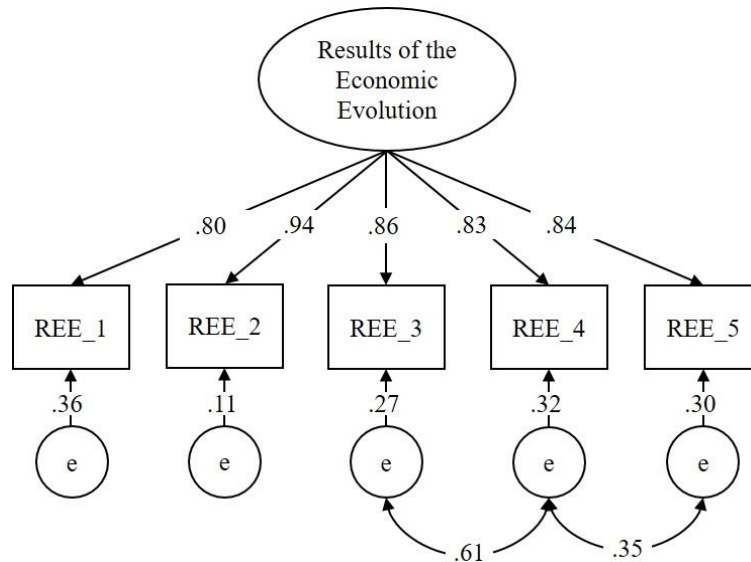
Figure 3: CFA model 3 of the results of the economic evolution with standardized estimates

Table 1: Goodness-of-fit indices for CFA models for intangible assets and results of the economic evolution

Model	SSχ^2	df	SSχ^2/df	RMSEA [90% CI]	SRMR	CFI	TLI
Intangible assets							
Model 1	57.17	20	2.86	.136 [.095 - .178]	.083	.686	.561
Model 2	4.15	5	0.83	.001 [.001 - .126]	.022	.999	.999
Model 3	17.87	19	0.94	.001 [.001 - .082]	.045	.999	.999
Model 4	11.37	13	0.87	.001 [.001 - .088]	.032	.999	.999
Results of the economic evolution							
Model 1	11.64	5	2.33	.116 [.023 - .204]	.034	.910	.821
Model 2	6.03	4	1.51	.072 [.001 - .180]	.024	.973	.932
Model 3	3.53	3	1.18	.042 [.001 - .180]	.014	.993	.976

4.3 Reliability

Reliability was measured using omega coefficient (ω). In this study, the data collected for organizational ambidexterity, intangible assets and results of the economic evolution showed excellent internal consistency reliability (Table 2).

Table 2: Descriptive statistics and reliability for organizational ambidexterity, intangible assets and results of the economic evolution

Variable	n_{items}	M	SD	ω	Interpretation
Organizational ambidexterity	6	23.99	4.74	.90	Excellent
Intangible assets	5	23.23	2.72	.91	Excellent
Results of the economic evolution	5	20.21	3.05	.90	Excellent

4.4 Structural Equation Modelling (SEM)

In the proposed model, the organizational ambidexterity explains the intangible assets and this in turn explains the results of economic evolution. Organizational ambidexterity directly influences the intangible assets and this does the same in the results of economic evolution. The model indicated a good fit (SSχ^2 = 113.52, df = 102, SSχ^2/df = 1.11, RMSEA = .034, SRMR = .063, CFI = .958 and TLI = .950). According to the obtained results, the

organizational ambidexterity explains in 58% the variability in the intangible assets and this explains 20% of the variance in the results of economic evolution (Figure 4).
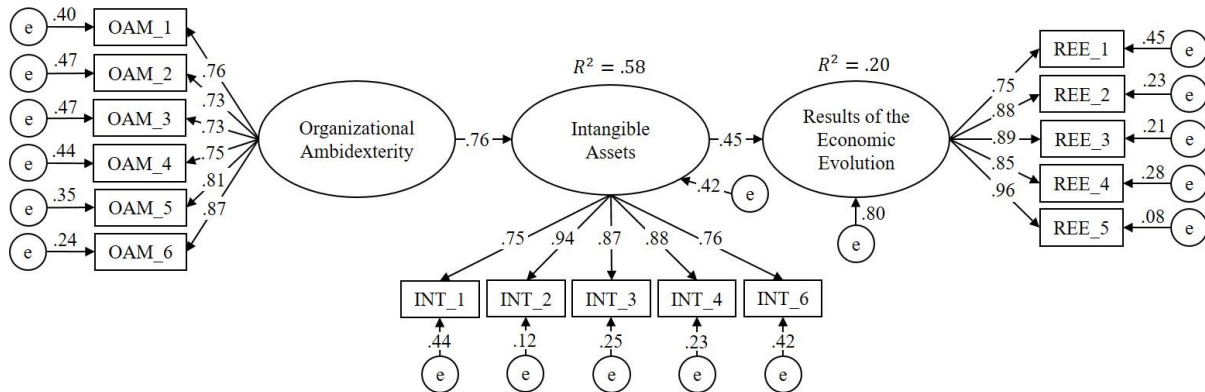
Figure 4: Results for the model that explains the results of economic evolution from the organizational ambidexterity and intangible assets

5. Conclusions

The objective of the study was to analyse the effect of organizational ambidexterity in obtaining intangible assets and the results of economic evolution in NTBFs. The two hypothesis presented through the theoretical review of this study were contrasted and confirmed in three phases. Firstly, validity evidence based on the internal structure of the scale. Secondly, the internal consistency reliability was estimated using the omega coefficient, and thirdly, SEM was used in order to validate the explanatory model of results of economic evolution and intangible assets from the evaluation of organizational ambidexterity.

Thus, organizational ambidexterity favours the obtainment of intangible assets linked to customer satisfaction, increase in number of customers, satisfaction of the employees, and increase in the level of quality of products and services. In addition, organizational ambidexterity related to the intangible assets obtained reflects the ability of NTBFs to generate greater use of the available resources, as well as the incorporation of new knowledge to integrate, build and reconfigure their internal and external skills. This is materialized in the continuous improvement of products and services, and external recognition of the firm for commercial purposes, generating favourable economic results.

Additionally, findings are in agreement with several previous studies. Severgnini, Vieira and Cardoza (2018), reported that organizational ambidexterity has a large effect (81%) on firm performance of software companies. Tamayo-Torres, Roehrich and Lewis (2017) found that organizational ambidexterity has a positive impact on firm performance and is more significant in dynamic environments than in static ones. Using a sample of 189 Italian knowledge-intensive firms (KIFs), Vrontis et al (2017) found that organizational ambidexterity is not directly associated with firm performance, however, it has an indirect effect through the mediation of knowledge resources external. Günsel et al (2017) provided evidence of the significant contribution that organizational ambidexterity has on the quantitative performance of small and medium sized enterprises (SMEs), while its effect is partial in customer satisfaction, product quality and employee satisfaction. Fu, Flood and Morris (2016) reported that relationship between organizational ambidexterity and firm performance is strong when professional service firms (PSFs) have high levels of organizational capital. Finally, Derbyshire (2014) found a strong positive effect of ambidexterity on economic growth in the manufacturing and scientific and technical services sectors in 45,113 firms in 15 European countries.

This analysis recognizes the validity of the approach made by Acosta-Prado and Fischer (2013) in its explanatory model, by demonstrating the feasibility, reliability, and validity of the scale used to measure the organizational ambidexterity, intangible assets, and results of the economic evolution, as a significant contribution in the analysis of the relationship proposed in the Colombian NTBFs. Another finding is the effect of the organizational ambidexterity in the creation of schemes of absorption, transformation and adaptation of new knowledge with an innovative approach, associated with the development and renewal of knowledge to understand the present and detect future opportunities from the clients' demands.

Finally, the study reveals two more contributions from the results. First, it opens the social scientific debate on the theoretical-practical analysis of the implications of organizational ambidexterity linked to the NTBFs strategic formulation in obtaining intangible assets and results of the economic evolution. Second, it serves as a guide to generate new lines of research that deepen the organizational conditions that favour the development of superior competences in this type of firms that, at present, leverages the promotion of entrepreneurial initiatives and new knowledge-intensive business projects that, at the same time, have favoured both the revitalization of traditional sectors (efficiency, growth and transformation) and the incorporation and development of new industrial productive sectors.

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Breaking Boundaries: Generational Cohorts Lead With new Work-Related Mindsets

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Abstract: Given that such research has not been undertaken, this case study explored a sample of local youthful business leaders work-related practices in the Middle East and North Africa. Progressive mindsets embrace new perspectives impacted by knowledge management of human capital. New generational cohorts have led business work-related mindsets virtually and face-to-face across borders and cultures--the Internet Generation, born around 1995, and the Millennials, born around 1975. Racially diverse, educated with an unprecedented technological skill, young business professionals seem to be driven by a mindset that prioritizes people within the organization while demonstrating less loyalty to the organizational structure they served. Furthermore, this shifting behavioral pattern of the youngest generational cohort differentiated many of the freshest business graduates. In effect, this shifting generational expectation seemed to be governed by a strong commitment to change quite different from millennials who are the "Look at Me" culture, driven to self-advancement, growth, and development. The case study was carried out on participants employed in the local marketplace. A survey was constructed. It focused on a local sample of intergenerational business people. A convenience sample of 81 was used: 44 men and 37 women. Two research questions were posed: (1) Research Question One: In your opinion, were the human resources in the business department in which you work well led? (2) Hypothesis One: Ranked Internet Generation business professionals led work-related practices better than Millennials. The result of the qualitative study and its main limitations imposed by time and space indicated that more comprehensive research is required in this area in order to better understand the work-related mindset of the Internet Generation and the Millennials, digital natives and digital immigrants, in the business arena in the Middle East and North Africa.

Keywords: intergenerational youth, human capital, knowledge management, internal network, leadership, MENA

1. Introduction

Racially diverse, educated with an unprecedented technological skill, young business professionals seemed to be driven by a mindset that prioritizes people within the organization while demonstrating less loyalty to the organizational structure they served. This shifting behavioral pattern of the youngest generational cohort differentiated many of the freshest business graduates. Youth seemed to be motivated to make the workplace interactive--more connected, more participative, and more inclusive, for everyone, everywhere irrespective of borders and nations, a potentially global strategy: Their vision of a better tomorrow, impacted by knowledge management of human capital, encompassed the world, not just their own backyard.

It is held that todays' youngest business generational cohort--the Internet Generation, the Generation Z, Nexters, or the iGen—seemed to have an appetite to change work practices, to break traditions and norms unabashed by its consequences—not because they were rebellious but simply because they strongly believed it was right (Twenge, 2018; Prensky, 2018).Their shifting generational expectation seemed to be governed by a strong commitment to change quite different from millennials who are the "Look at Me" culture, driven to self-advancement. This case study explores a sample of these youthful business leaders work-related practices in the Middle East and North Africa given that such research has not been undertaken.

The first part of the research paper reviews literature on the youngest generational leadership in business organizations. Following the literature review, the research methodology adopted includes the purpose of the study, research questions, participants, procedures, research design, as well as analysis of data and rubrics. Then, the fourth section discusses the research findings drawn from the study. The conclusion clarifies the implications and limitations of the research as well as proposes recommendations on future research.

2. Literature review

The literature review reflects on the theory and practice of key research variables explored in this case study: work-related mindset of intergenerational cohorts, business leadership, and the MENA context.

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Perceptions or realities on work-related mindsets of generational cohorts in business contexts tend to differ. A generational cohort is a group of individuals similar in age who have experienced the same historical events within the same time period; in this paper the term "generation" is not familial but is based on the shared position of an age group. The emergence of millennials also called Generation Y born in 1975 and the newest generational cohort, the internet generation, Generation Z, Nexters, dot.com or iGen born in 1995, seemed to have impacted the business work context. As the internet generation entered the business sector in force, intergenerational cohorts have had to accommodate them, especially millennials (Deal, Altman, & Rogelberg, 2010; Howe & Strauss, 2007; Ryder, 1965; Mannheim, 1952).

Different generational cohorts, the silent generation (Veterans born 1924-45), latch-key children (Baby Boomers born 1946-64), Generation X (born 1965-75), digital immigrants (millennials), or the internet generation (iGen or Generation Z), have worked side-by-side in business contexts. With respect to millennials, only a few small statistical differences on the workplace mindset of employed adults among generations at the same age across time have been found like high levels of entitlement, self-c0nfidence, and self-efficacy. Research has found similarities and small differences in work centrality, work ethic and loyalty, satisfaction with pay, job security, turnover intentions, altruistic work values, marginally higher job satisfaction, career development and advancement, recognition, higher personality traits as self-esteem, assertiveness, and narcissism (Twenge, 2014; Myers & Sadaghiani, 2010).

In addition, it has been posited that the changes in attitude and behavior may have been impacted by the rise of global wealth. The thriving affluence and prosperity that seemed to mark the 1990s may have shaped the mindset of the millennial. Wealthy over-indulgent parents may have striven to do the utmost to develop their children, supporting and catering to the millennials cognitive and affective needs by providing a well-rounded education and lifestyle (U.S. Department of Education, 2019; Twenge & Campbell, 2010).

However, the general environment the internet generation was socialized in was a decade of economic recession and economic uncertainty following 9/11 and a decade of war on terrorism in which working parents many of whom driven by were by self-enhancement and self-achievement rather than catering to their children's cognitive and emotional needs (U.S. Department of Commerce, 2019; Hill & Hernandez-Requeto, 2018; Deresky, 2017; Kowsky, Rasch, & Wiley, 2010; Gordon, 2016).

Furthermore, studies posited that the internet generation, unlike millennials, started their career early, in middle school, in high school, or in university, learning through internship programs; debating and questioning conventional procedures; being entrepreneurial; exhibiting self-efficacy, humility, and flexibility (Twenge, 2018; Hernandez, 2017; Cameron & Pagnattaro, 2017).

Moreover, the internet generation as millennials multi-tasked, but unlike millennials, research studies posited that the internet generation were more productive in doing so which may be related to their broad access to a range of information from an early age, their ability to process a great amount of information, and their access and command of information technology (U. S. Labor Union Statistics, 2019; Prensky, 2016)

Furthermore, technology has played a pivotal and instrumental role in business context. Indeed, technology seemed to have impacted the development of cognitive skills among intergenerational cohorts influencing critical thinking, problem solving and communication. Nonetheless, higher order critical thinking and reasoning may also have been engendered, day-by-day in the context of leadership in a physically nurturing workplace (Yukl & Gardner, 2018; Reynolds, 2016).

Research studies posited that contemporary workplace practices differed from those held traditionally. Modern business structures have been more decentralized and team-based; leadership more supportive; less authoritarian and hierarchical. Studies showed that many modern business leaders have empowered followers teaching them onsite in seminars and workshops or though intensive college training and/or programs. Empowerment and accountability have always been seen as powerful business tools embedding responsibility. These tools have been used by many leaders because leadership has been seen as the ability to influence a group towards the achievement of a vision or set of goals (Robbins & Judge, 2019; Akhras, 2019)

Moreover, studies have shown that modern leadership, in general, has been posited as leading the company in a motivating, supportive and collaborative manner. Leaders upheld, counselled, and mentored followers. Other

researchers have asserted that leadership was an influence relationship, upward and downward by those who intended change and implemented real change through shared purpose. Influence for modern leaders meant an active reciprocal relationship. It was not coercive, hierarchical, top-down, and/or authoritarian rather a positive internal communication network (Wheelan et. al, 2019; Akhras, 2019a).

In addition, business research has shown that communication has been perceived as the backbone, the spinal cord on which all information flows, upward, downward, laterally or diagonally. In business organizations, communication has ensured that meaning is transferred and understood. Communication has helped to process employee interaction. It has helped to facilitate control, motivation, expression of emotion and sharing of emotional expression. Through communication networking, many leaders empowered and made staff accountable; in delegating managerial roles and functions, some leaders remained responsible knowing that as others adopted their roles, a specific course of behavior would follow. Many leaders have used communication to ensure others implemented procedure and abided by rules and regulation. Each of these four different kinds of behavior included reflection and action—thinking and doing, at times with entrepreneurship (Scarborough & Cornwall, 2018; Robbins, DeCenzo, & Coulter, 2018; Schlender & Tetzeli, 2015).

In modern management, these communication processes many times have led to employee involvement and participation, a process that used employee input to increase their commitment to organizational success. Research has shown that many times when employees or teams were engaged in decision-making that increased their autonomy and control over their work lives, many times employees became more motivated, more productive, more committed to their organization, and more satisfied with their jobs and workplace (Dessler, 2020; Ferrel, Hirt, & Ferrel, 2018).

In addition, research held that these contextual variables of inter-generational cohorts, of leadership mindset and workplace practice were many times true in the United States of America and in the developed world. What is equally important is whether these contextual factors are true elsewhere. This case study was conducted in Lebanon which is in the Middle East and North Africa with the objective of determining whether these contextual factors were the same there given that Lebanon is facing internal and external confounding factors.

Lebanon has a free market tradition and a capitalistic structure. Despite its history of private commercial activity and prosperity built on Lebanon's position as a regional center for finance and trade, 44 years of war, parliamentary deadlocks, public strikes, regional political turmoil, and a weak government have resulted in ongoing fiscal and current account deficit. Moreover, another confounding factor is that Lebanon is ranked 12th of 14 countries in the region with its economic freedom overall score below the regional and the world average (https://www.heritage.org/index/country/lebanon; https://www.worldbank.org/en/country/lebanon).

In brief, having given the literature review on mindsets of intergenerational cohorts, business leadership workplace practice, and the MENA, the methodology undertaken in this case study follows.

3. Methodology

The methodology covers the purpose of the study, research questions, participants, procedures, research design, analysis and rubrics used in the study. The case study is a descriptive exploration of entrepreneurial leadership focusing on two variables in a local context. The purpose is two-fold: (1) Research Question One: In your opinion, were the human resources in the business department in the company in which you work well led? (2) Hypothesis One: Ranked internet generation business professionals led work-related practices better than millennials.

Two research questions were generated in order to explore business leadership in the local context:

▪ Research Question One: In your opinion, were the human resources in the business department in the company in which you work well led?

▪ Hypothesis One: Ranked business internet generation professionals led work-related practices better than millennials.

The 81 participants in this case study whose age ranged between 18-45 were 44 young men and 37 young women. They lived in different districts and were employed in the local business industry in a number of fields of specialization. Mature and pragmatic, they understood the concepts being assessed.

A survey was constructed. The survey opened with an assurance of confidentiality related to information shared and a request for honesty and clarity on data related to workplace practices. Following the assurance of confidentiality, preliminary demographic questions were included. Four questions further explored leadership. These four questions asked the participants to rate variables on the Likert type scale from 1-5 where 1 had the weakest value and 5 the highest. Furthermore, two open-ended questions that required reflection and discussion was included. The survey was handed out. The participants were assured of confidentiality related to the information they shared. The participants were given 20 minutes to respond to the survey and were reminded to be open, honest, and explicit.

The research design applied is a case study. It uses descriptive exploration. It focuses on two variables in workplace practice in a localized context in the MENA. Descriptive statistics, Chi Square and Goodness of Fit were used to analyze the data collected and to study the participants' perception of the local workplace context. As a result, three variables were assessed: leadership, intergenerational cohorts, generational leadership whereby the participants were asked to evaluate leadership in terms of developing human resources, to elaborate on generational cohorts in terms of work-related practices in their workplace, and to rate generational leadership on four work-related variables.

A rubric was developed to assess leadership in practice. The rubric on leadership was used to assess four variables. The rubric served to assess participants' perception of leadership on the Likert Scale (On the Likert Scale 1 reflected the nonexistence of leadership and 5 reflects its regular application) (see Table 1 below).

Table 1: Rubric to assess intergenerational leadership

1.0 point	**2.0 points**	**3.0 points**	**4.0 points**	**5.0 points**
When participants do not perceive any leadership.	When participants perceive a little leadership.	When participants perceive an average level of leadership.	When participants perceive more than an average level of leadership	When participants actively perceive leadership.

In short, given the noted methodology and the reviewed literature on the local business context, mindset of intergenerational cohorts and leadership, in what follows, the results of the case study are discussed.

4. Results and discussion

The results of the case study are discussed below covering intergenerational mindsets and leadership cohorts in the MENA with respect to the results found on Research Question One and Hypothesis One beginning with a reflection on whether the exploratory case study was reliable.

Cronbach's alpha was greater than 0.7: therefore, the results were found to be reliable. Cronbach's alpha is a measure of internal consistency: how closely related a set of items are as a group. Moreover, Cronbach's alpha is considered to be a measure of scale reliability (see Table 2).

Table 2: Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.363	.712	20

4.1 Research question one

With respect to Research Question One--In your opinion, were the human resources in the business department in which you worked well led? --the results affirmed that the 71 participants out of 81 stated that the department in which they worked were well led. It was shown that the 89% of the participants stated that their department head used decision making authority well even though at times the local marketplace was challenging. Moreover, the participants made the following observation on business leadership inside the department in which they worked.

- For example, the new CEO of a salmon production factory has been [recently] assigned. He has made more progress in HR in the company than any of the older previous CEO

- Our manager is a leader--a true leader: He broke the ice of hiring foreigners in the embassy just because the applying person is very eligible to have the job.

- Rule # 7: Leaders use leadership skills to improve them [followers] and teach them making sure they [followers] will not commit mistakes.

- My leader--at work--clearly described my jobs and related activities in the hiring process…And, then he mentors… he also explained what the job is about.

- Our leader leads well: he decided to give bonus incentives to the employees who reached the target and increased company's profit.

These examples clearly illustrated how the participants perceived youthful leadership in the department where they worked: progressive, innovative, influencing, guiding, teaching, promoting, supporting and motivating pragmatically. For instance, with respect to the first example, the youthful leader worked innovatively to improve its human resource department. This young leader, though new to the company and industry invested in developing the human resource and the rank and profitability of the company in which s/he worked.

The second example showed how many participants/leaders who belonged to the younger generation, in general, tended to be more open-minded because they were brought up in a more diversified and globalized culture. In this example, the young leader established a new hiring system in the Human Resource Department that hired foreign candidates because they had professional competence needed in their industry. Moreover, the leaders shown in the third and fourth example reflected leaders as being a champion of learning. Research studies have shown that the younger generation valued learning, anytime, anywhere (Iorgulescu, 2016; Bencsik, Juhasz, & Horwith-Csiko, 2016); thus, the participants who were asked to evaluate their leaders were impressed because their leader was an educator: s/he ensured that they learned how to do their job; how to improve productivity; and how to sustain excellence.

Furthermore, what is interesting about example 5 is that the participants have not only shown leaders motivating them but being fair and equitable in a challenging economic sectarian local context.

In short, the image of leadership shared by the participants were clear: 89% held that leaders in the departments in which they worked adopted a more participative leadership style, geared to meeting many of their cognitive and affective needs.

4.2 Hypothesis one

With respect to the results of Hypothesis One--Ranked Internet Generation business professionals led work-related practices better than Millennials--it is clear that the participants held different views. In what follows, the results regarding intergenerational cohorts and intergenerational business leaders are shown then a discussion of the results follows.

4.2.1 Results on intergenerational cohorts

Drawn from the question, explain which generational cohort, the internet generation or the millennial, is a better business leader, 61.7 % favored the internet generation leaders while 38.3 favored millennials. Table 3 below indicate the participants' choice of intergenerational cohort.

Table 3: Choice of Intergenerational Cohort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Millennials	31	38.3	38.3	38.3
	Internet Generation	50	61.7	61.7	100.0
	Total	81	100.0	100.0	

4.2.2 Results on intergenerational business leaders

Moreover, the results related to Hypothesis One evaluated whether, based on four independent work-related variables--ranked internet generation professionals were better leaders than millennials. A Likert-scale based questionnaire was used to collect the students' opinion in terms of perception of intergenerational leadership. Answers were on a scale from 1 to 5, were 1 indicated low perception of the leader using leadership tools and 5 indicated high perception of leader using leadership tools (see Table 4 and 5). In addition, four variables of

leadership were evaluated. The majority of the answers asserted that leaders used the four tools. Chi-square was executed to test the Goodness of Fit of the answers. Most of the answers fell in the category 4. demonstrated a high level of residual from the expected equal answers (see Figure 1).

Table 4: Goodness of fit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.5	2.5	2.5
	2	3	3.7	3.7	6.2
	3	23	28.4	28.4	34.6
	4	43	53.1	53.1	87.7
	5	10	12.3	12.3	100.0
	Total	81	100.0	100.0	

Table 5: Chi Square

	Downward	Upward	Customer	Lateral
Chi-Square	29.802[a]	36.346[a]	11.750[b]	23.877[a]
Df	4	4	4	4
Asymp. Sig.	.000	.000	.019	.000
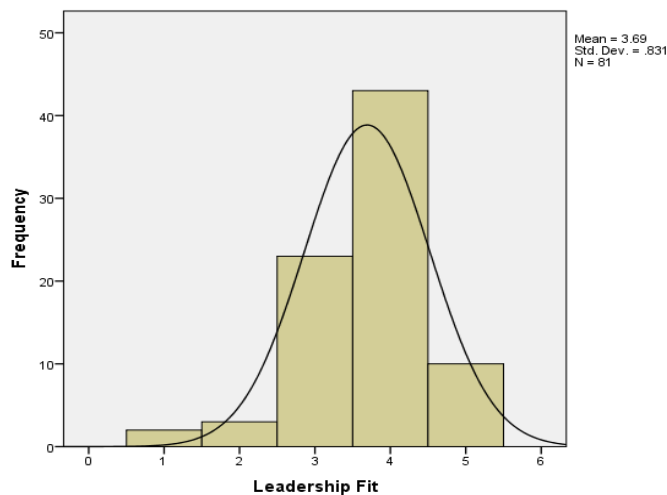
Figure 1: Leadership fit

4.2.3 Discussion of hypothesis one

The results drawn from the survey on the most appropriate choice of intergenerational leadership within the business context showed that 50 of the 81 firmly believed that the internet generation business leader rather than the millennial seemed more enabled to meet department needs. Perceptions drawn noted the following:

- Our Internet Generation leader is good…because leaders should lead by example…. hiring, promotion, and firing process must be a strong trait that a leader possesses…with integrity and transparency to promote equality and fairness.

- My supermarket manager is Internet Generation. She is responsible of all employees…she follows up with us to ensure we are all ok…that the company rules are done right…that we are fine…

- The boss is Internet Generation. She is down to earth and leads by example...different from other leaders…different from other millennial leaders…she is the supervisor…more effective…clear communication.

- The leader in my workplace is older than generation Y and the Millennial does not share much information. We have to ask others for help.

- Our Millennial leader has excellent relation with customers but not with us.

These perceptions drawn focus on the internet generation being more of a communicative work-related leader. As is illustrated in the examples, the participants asserted that many times their internet generation leader was

honest, open-minded, and pragmatic. In addition, local internet generation leaders seemed to be interactive, connected, and supportive. However, millennial business leaders, born between 1975-1994, were many times described as lacking loyalty, holding negative work predisposition and behavior, narcissistic and self-absorbed. In addition, the millennial "Look at Me" leader in this case study seemed to be perceived to be less interactive and more hierarchical than the participants found appropriate as has been noted by other researchers (Toth-Kazas, 2018; Twenge and Campbell, 2010; Howe & Straus, 2007).

Then, the literature reviewed showed that the internet generation, Nexter, dot.com, iGen, or the Generation Z have been known as the highly connected generation-- highly skilled in technology and very much connected to people. The local MENA perceptions supported these findings some examples of which are noted below:

▪ Internet Generation leader knows the quality of products needed to build customer satisfaction and our [participants'] satisfaction...and he works on it….

▪ Our boss wanders around to build a net of public relations… especially with the stakeholders.

▪ In company where I work, the Internet Generation leader regularly interacts with us chatting, drinking coffee…with customers…with some subordinates…She works with us…observes…she knows how the company is doing.

The images drawn by the participants of young business leaders are those of influential leaders building cognitive-affective work-related relationships. Based on the results, it seems that leaders positively influenced their context. Local leaders communicated in an active reciprocal relationship that seemed to be multi-dimensional, a leader-follower and follower-leader internal communication network.

These internet generation leaders seemed to have influenced those around them and used communication as direct and indirect tools inside their business units. Information flowed upward, downward, laterally, and outward/inward--to control, to motivate, to express emotion, and to inform. For instance, the internet generation business leaders directly/indirectly controlled workplace practice to meet departmental/organizational targets.

Moreover, these young leaders tried to create functional work relationships within the business units to enhance organizational performance: participants stated that their internet generation leaders motivated them to develop themselves: local leaders used communication to clarify what had to be done, how well participants were doing, and what should be done to improve performance when they did not meet the benchmark. As their leaders set specific goals, participants worked towards those goals and received feedback on progress toward goals.

In addition, the participants saw their leader making an effort to create a social network, an internal network, in their work unit as their primary source of interaction in which meaning flowed laterally, upward, downward, or diagonally. Inside these local business organizations, communication transferred participants' understanding of meaning. As a result, emotional communication was transmitted within the business unit—a fundamental mechanism through which participants may have shared happiness, frustrations, disappointment, and feelings of satisfaction. Being able to emotionally express feelings at work was a social need participants valued. Furthermore, participants knew that business leaders needed to facilitate the flow of information to make decisions: communication served that function transmitting data upward, downward, laterally, and outward to stakeholders (see example3).

In short, the discussion reflected a promising context: It seems that the Middle East and North African young business leaders, impacted by knowledge management of human capital, knew how to contextualize leadership. Despite years of war, economic recession, parliamentary deadlocks, public strikes, and a weak government, the internet generation, the youngest intergenerational cohort, bred into this network, proved able to be a manager who attained organizational objectives by interacting with others—MBWA. Internet generation business leaders seemed to be objective and multitasking progressive business leaders. Even though the economic context was difficult, ongoing fiscal and current account deficit, the internet generation leader seemed to have overcome that hurdle and was resilient, supportive, and connected.

5. Conclusion

This case study explored data on the youthful business leaders, the millennials and the internet generation, taking into account their work-related mindset and leadership approach fashioned in the localized business context. The result reflected a positive appraisal on leadership and the inception of a new status quo—a communicative potentially horizontal mindset, one that used interactive participation of leader-follower and follower-leader. What can be concluded from this exploratory work is that the internet generation born and bred in the Middle East and North Africa seems to be quite similar to the American internet generation—investing knowledge management of human capital well.

MENA internet generation were uniquely differentiated from millennials. The internet generation business leaders creatively connected using leadership and communication tools to serve business needs: they talked face-to-face; they held meetings; they tweeted; they were on LinkedIn; they used Instagram; they held town hall meetings; they blogged; they used Facebook; they chatted; they texted; and they emailed round the clock. MENA internet generation business leaders were networking because they really were borderless business leaders. They were not bound by organizational hierarchy or culture where the case study was conducted because the internet generation was multi-dimensional. It is for this very reason that additional research is needed. Businesses need to learn the mechanics of internet generation leaders, especially in the MENA.

A number of limitations were met in this study. As this is a case study, one of the limitations met was that the sample was relatively small: 81 participants were drawn as representative sample on leadership across borders and culture: MENA internet generation and millennials. A second limitation in the research may have stemmed from the fact it was a convenience sample: even though business leaders were drawn from different districts across the country they were in fact drawn. A third limitation was that the level of the state of leadership using leadership tools was measured only at a single point in time. Measurements at one or two times do not allow for the manifestation of lability. It would be more accurate to measure a number of times in order to predict performance outcome.

Although exploratory rather than experimental, the strong relationship that showed that the internet generation better serves leadership than millennials is an outcome that ought to be further studied. Based on the results, as a practitioner-researcher, I firmly believe that additional exploratory research in studying both the internet generation and millennial business leaders is necessary because despite the challenges of conducting business in the MENA, youthful business leaders meaningfully network 24/7 to create a physically supportive environment that attained objectives.

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Understanding Collaborative Advantage and Value Co-Creation Through Social Capital Theory

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Abstract: The aim of this paper was to extend the conceptualization of the value creation process in social systems by including concepts and measures from social capital theory to detail how actors' positions within social structures influence their access to resources and collaborative advantage during resource integration and value co-creation efforts and processes. By drawing on the network structure of social capital, a conceptual framework is developed to relate an actor's position and network structure with resources including trust, solidarity, risk reduction, access to non-redundant sources of information or control. The framework set shows how social capital resources improve an actors' collaborative process and learning competencies, adaptive, absorptive and resource integrations capacities that form the basis for collaborative advantage needed to co-create value. This article reveals that social capital is an important concept for understanding collaborative advantage, in the pursuit of value creation.

1. Introduction

Resource integration (RI) is the cornerstone of value co-creation (Kleinaltenkamp et al., 2012; Mele et al., 2010; Cheung and McColl-Kennedy, 2015). According to S-D Logic Value is co-created when an actor integrates and operates on own resources, such as knowledge, skills and competences with other public, private or market-faced resources in an effort to arrive at intended outcomes such as increased well-being for the focal actor and/or for other actors (Vargo and Lusch, 2004, 2008, 2011). This process of RI is a collaborative process, and is dependent on the accessibility to other resources and actor's individual capacity to adapt and integrate the resources he or she can access in his or her network of relationships and resources (Akaka et al., 2012). In this sense, it is important to understand how actors access resources and what kind of resources they access in order to gain what Vargo and Lusch (2016) call strategic benefit.

The work of Laud et al. (2015) has used social capital theory to offer an explanation on how embeddedness is a critical element for understanding resource integration processes. However, the study do not allows understanding how the actors' position within the social relation networks influence its capacity to access and integrate resources in co-creation processes. In other words, there is still some questions to answer, namely, how an actor's position within a service ecosystem gives him access to certain types of resources. How an actor's position within a service ecosystem influences the level of trust, reciprocity and sanctions in its social relations?

According to Vargo and Lusch (2016) value is created collaboratively among actors. However, to collaboratively exchange resources and co-create value actors need to access the best combination of resources to be mobilized in a particular situation (Normann, 2001), thus collaborative advantage is needed. Collaborative advantage is dependent on an actor's competencies to select and interact with the best actors in order to exchange and combine resources (Lusch and Vargo, 2014). By its turn, Social capital relates to resources embedded in and actor's interpersonal relationships involving sympathy, which means preferential treatment, potential benefit and advantage (Robison et al., 2002); entities having a social structure in common (obligations, expectations, trust, and information flows) (Coleman, 1990) that facilitate certain actions of actors while inhibiting others (Coleman, 1990; Putnam, 1993; Nahapiet and Ghoshal, 1998); opportunities to use other forms of capital (Burt, 1992); the capacity of actors to command scares resources (Robison et al., 2002); and non-tradable friendships or obligations (Nahapiet and Ghoshal, 1998). Therefore, we argue that through social capital, actors improve their collaborative advantage; this is, through social capital actors improve their capacities to integrate, adapt and mobilize resources that, by its turn, maximizes density and therefore value co-creation processes.

In this sense, the aim of this paper is to extend previous works by informing how social capital helps resource integration, adaptation and mobilization to improve an actor's collaborative advantage. By drawing on the network structure of social capital, it informs what type of resources constitute social capital and how networks structures and actors position within the networks improve collaborative advantage dimensions. We also, draw on an actor's centrality measures to inform how an actor's position with the network of relationships can access resources such as trust, proximity, control, novelty or power in order to enhance his competencies for collaborative advantage.

In the next section, we detail how resource integration takes place in the context of social networks. Then in the following sections, we use social capital theory to explain how social capital relates to an actor's position within the network and the network structure and achieve collaborative advantage in co-creation processes. Finally, we elaborate some conclusions and implications for actors.

2. Resources integration and social capital

Actors need to exchange resources with other actors because no actor in isolation has the necessary resources to create value (Vargo et al., 2008). To establish exchanges in a relationship reciprocally, actors must turn to their extended relationship networks and improve their own resource integration processes (Chandler and Wieland, 2010). Density is essential for mobilizing resources at the right time and place and enhancing actors' system viability (Lusch and Nambisan, 2015). In this sense, we can think of networks as means to achieve density. Maximum density can be achieved when, at a given time and place, an actor supplies and integrates all the resources necessary to create the greatest value possible in that context, reached by altering the network's value structure (Lusch et al., 2010).

Lusch and Vargo (2014) refer to the capacity of achieving maxim density as a collaborative advantage which is dependent on the actor's collaborative process competency (capacities to select the best actors to work with, develop collaborative relationships, and manage collaborative processes); absorptive competency (capacity to understand tendencies in the environment and service ecosystem); adaptive competency (absorb new information and knowledge from other actors and from the service ecosystem); resource-integration competency (capacity to optimize the integration and combination of resources); and learning capacity (capacity to become a vital part of and support the service system).

Social capital is a resource that can help actors to achieve maxim density or collaborative advantage. Social capital entails resources embedded in social relations and social structure, which can be mobilized when an actor wants to succeed in purposive actions (Bourdieu, 1985; Portes, 1995; Coleman 1998; Burt, 1992; Lin, 2001). Two main propositions of social capital theory are that networks of relationships are valuables resources that lie in the social relations of the individual or entity, and the success of action is positively associated with social capital (Lin, 2002, 2005). Resources derived from social capital include, for example, the acquisition of information, obligations of reciprocity derived from systems of mutual trust or the use of cooperative social norms (Foley and Edwards, 1999).

Therefore, we argue that through Social Capital - possibilities of action and access to resources that social ties provide an actor – we can understanding how actors' density and collaborative advantage change according to the particularities of the social network of which they are part and consequently their way of integrating resources to create value.

Nahapiet and Ghoshal (1988) assert that social capital has three dimensions: structural, cognitive, and relational. The structural dimension refers to the overall pattern of connections among actors, including who can be reached and how (Burt, 1992). The most important facets of the structural dimension include the existence (or not) of ties in the network (Wasserman and Faust, 1994) and the network configuration in terms of density, connectivity, and hierarchy (Krackhardt, 1994) (Coleman, 1988).

The cognitive dimension refers to resources that provide systems of meaning, shared representations, and interpretations among parties. The most prominent facets are shared codes of language (Cicourel, 1973) and shared narratives (Orr, 1990) that predispose people towards mutually beneficial collective action.

Finally, the relational dimension describes the kinds of personal relationships people have developed with one another through their history of interactions (Granovetter, 1992). Among the main facets are trust and trustworthiness (Putnam, 1993), norms and sanctions (Coleman, 1990), obligations and expectations (Coleman, 1990), and identity and identification (Hakansson and Snehota, 1995). A central idea guiding social capital theory is that the trust and goodwill actors feel towards one another is a valuable resource, and the effects arising from that goodwill include information, influence, and solidarity (Adler and Kwon, 2002).

All structures and social relationships provide some form of social capital, and one of the most important forms is the potential that information, in combination with other resources, can lead to different results for the actors involved (Coleman, 1988), suggesting asymmetric relationships. In the following sections we will explore how network structure and quality of relations can change according to an actor position within the social network and consequently with effects on his collaborative advantage, resources integration practices and value co-creation.

2.1 Network based social capital and collaborative advantage

Social capital can be seen as the structure and the quality of social networks (Stone, 2001). In this sense, it relates with structural characteristics as open versus closed networks, dense versus sparse networks and homogenous or heterogeneous networks as well as with quality of social relations as trust (individual versus generalized trust) and reciprocity.

Coleman (1988) and Granovetter (1985) argue that a more closed social structure provides stronger relationships, social norms, and sanctions that facilitate trust and collaborative exchanges. Burt (2001) defines network closure as the degree of connection among all the actors in a network, so no actor can escape being noticed by the others. In this type of network important forms of social capital are the potential for information that inheres in social relations, and the existence of sanctions and norms that guide and monitor behaviour, thus enhancing trust (Coleman, 1998). Because in a more closed network everyone knows each other, it is more difficult no to comply with rules, thus making less risky for actors in the network to trust one another.

Several empirical research exist about the type of resources an actor can retrieve from closed networks characterized by strong ties. The works of Granovetter (1985), Coleman (1988), Nahapiet and Ghoshal, (1998), Adler and Kwon (2002), and Zhao et al. (2016) point to resources such as solidarity, share of tacit knowledge, recognition of the value of new knowledge, achieving value, availability, risk reduction, and trust.

Burt (1992) instead, claims that networks with structural holes or weak ties - that is, more open networks in which not all members relate to one another - contribute more to an actor's social capital, by offering opportunities for brokerage of information flows across people and control of projects that unite people from different parts of the network. Those with network contacts that have many structural holes are actors with greater knowledge and control of more rewarding opportunities (Burt, 2000), because structural holes divide non-redundant sources of information (Burt, 2001). Actors occupying brokerage positions in networks then have greater access to information and enjoy comparative advantages in negotiation relationships (Gargiulo and Benassi, 20009), which correspond to the social capital proposition that the weaker the tie the greater the possibility of accessing better social capital for instrumental action (Lin, 2002).

Adler and Kwon (2002) argue that if the results require trust and cooperation, closed networks are more advantageous, but if the goals require economic rationality and market competition, a network with more partners is more effective. In the same way, these authors refer to the certainty and uncertainty of tasks. For uncertain tasks, closed networks provide exchanges of tacit knowledge and are better, but if the task is certain, a network with structural holes is preferable, because it represents the most cost-effective way to access a wider, more diversified range of information sources.

In Figure 1 we observe both types of networks and the type of resources associated with each. Cluster 1 represents a more closed/dense network where almost all actors connect among each other. Cluster 2 represents a more open/sparse network where actors only connect to some of the other actors in that cluster.
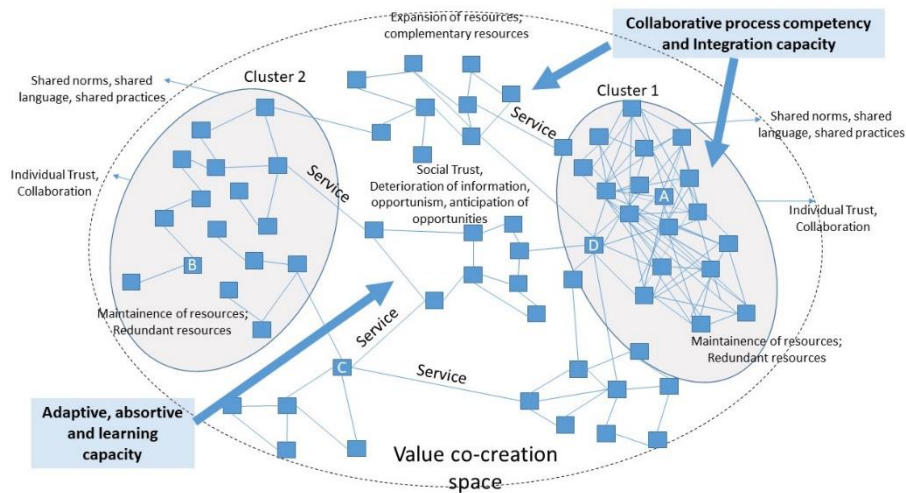
Figure 1: Service-for-service exchange in sparse and dense networks of social capital

2.2 Capacity to develop and manage the collaborative process

According to Lusch and Vargo (2014), collaborative advantage is dependent on the actors' ability to develop and manage the collaborative process needed for resource exchange, which encompasses the competency to select the best actors to exchange resources and the capacity to develop and manage collaborative relationships. However, to make this selection, actors need first to define what type of resources they need.

Gummesson and Mele (2010) claim that resources integration can take the form of complementarity when actors do not have the needed resources to achieve a certain goal; the form of redundancy when actors need to reinforce their resources, which allows them to achieve a common cognitive ground for collaboration and integration of resources; and the form of mixing when includes both type, redundant and complementary resources.

In this sense, if the type or resources needed are redundant, the actors should resort on their closest relations, since according to the homophily principle of social capital, close relations are usually very similar on resources (Lin, 2001). However, an actor's capacity to choose the best actors to interact with can also be affected by the opportunity an actor has to have access to other kind of relationships belonging to other groups that share other norms, values and language. Without being aware of other opportunities actors cannot decide which actors are best to interact with. For this, an actor needs to have access to other clusters of relationships. Actor D in figure 1 could exemplify a privileged actor, since this actor have access to both, a dense and close network and distant networks, those allowing these actor to have the greatest opportunity to select the best actors with whom to interact.

In denser networks formed by groups of relationships characterized by sympathy, preferential treatment, obligations and expectations, trust and information flows (social capital), actors end by sharing norms, values and language that facilitates resources exchange. Resources such as trust, the sharing of tacit knowledge, risk reduction, greater availability and recognition, and fulfilment of value provide an improved capacity to improve an actors' collaborative process competency since within these networks, actors can more easily exchange and leverage his own and other actors' resources, and combine them with other actors' resources in relationships of mutual benefit. This would be the case for Actor A in figure 1 when compared to actor B, C or D. In a denser network an actor will be able to improve his capacity to choose the best actors to interact with as in a denser network with strong ties, like family and friends, they know each other better. At the same time, when the actor moves within a known and close structure of relationships, his capacity to develop and manage collaborative relationships is likely improved. However, is important to highlight that the degree centrality of an actor influences this capacity. Degree centrality quantifies the set of relations linking a given actor to others in the network, highlighting this actor's prominence in the network of proximity. An actor with high degree centrality thus is one with many close relations and therefore greater trust, reciprocity, and availability; it will be easier for this actor to manage a collaborative process as his or her relationships allow him or her to strengthen essential intra-group collaborations prior to entering into an inter-group collaboration.

The collaborative process also involves developing and managing collaborative relationships. According to Coleman's (1998) network cohesion theory, networks with closely connected actors foster trust and cooperation. Furthermore, cohesion causes collaborative norms. Network density has been used as a proxy for social cohesion (Frank and Yasumoto, 1998). In this sense, we can stablish a connection between a network closure and norms of collaboration. As Keefer and Knack (2008) state, social heterogeneity, which is gained when actors move away from their close relations, reduces the likelihood of consensus among actors. Existing literature documents a positive relationship between dense networks and individual willingness to devote time and effort in assist others, as well as stablish consistent norms of cooperation (Reagnas and McEvily, 2003).

A sparse network with structural holes can help improve the capacity of the collaborative process by allowing the actor to rely on both networks of close relationships and those that are more distant. Through the bridges, these actors build and then select the best actors with whom to work, thus improving an actor's capacity to develop collaborative process competency.

2.3   Adaptive and absorptive capacity

Adaptive competency relates to understanding what is going on in the environment and service ecosystem, and absorptive capacity relates with the competency to how to absorb new information and knowledge coming from other actors and from the service ecosystem. Although an actor can rely more easily on his closest relations (closed networks/strong ties) to get information, the principle of homophily tell us that the information obtained from these relations tend to be similar to the one the actor already has, and therefore, of little use (Lin, 2001). On the other hand, actors that do not share the same group or even the same ecosystem, and therefore not sharing the same interests, may provide information more interesting (Lin, 2001). In this case, trust, which is characteristic of close relations, replaces social trust and institutions need to be present so that the information received can be considered trustable and understandable. The same happens with absorptive capacity that can be enhanced only if there are shared codes and common language, otherwise the obtained resources cannot be integrated in a useful way for the actor.

A sparse network with structural holes can help the focal actor improve his adaptive and absorptive capacity, because it provides access to non-redundant information, an anticipation of opportunities, and a greater capacity to understand and anticipate tendencies in the environment. To that, is important actors have low closeness centrality, this is, they need to be well connected to a service ecosystem in which they are closely linked with others, which allows them to transmit and receive information and ideas quickly, which is important in situations of instability and rapid changes (Chandler and Wieland, 2010). Also, actors need to be connected to other actors in the network with prominent positions (Chandler and Wieland, 2010). This represents an actor influence in the complete network. Absorptive capacity for new information and knowledge also can be improved with high eigenvector centrality (determines the number of connections with powerful actors; Chandler and Wieland, 2010), because it offers access to power relations in the network and therefore a greater flow of information.

2.4   Resource integration capacity

The capacity of combining and integrating the available resources is influenced also by the network structure of an actor. If an actor has access to a limited amount of resources, its capacity to achieve the best combination of resources is also limited. Therefore, belonging to a network of relationships that span through dense and sparse networks improves collaborative advantage through an actor's resource integration competency. This would be the case for actor D.

Actors with contact networks rich in structural holes are the actors who know about, have a hand in, and exercise control over more rewarding opportunities (Burt, 2000). Thus, the capacity to integrate resources increases through both types of network configuration, namely, a dense network and a sparse network. Through these two types of network configuration, actors maximize their possibilities to combine resources, whether in terms of similar resources (dense network) or in terms of complementary resources (sparse network).

This is more valid for actors that are located at the border of service ecosystems because other actors are dependent on them. The same applies to actors that have access to power relations in the network. These actors are responsible for stablishing trust across systems. Actor D on figure 1 is an example of this type of actor. If it

did not exist, there would not be any connections among cluster 1 and all the other networks of actors in this service ecosystem. Therefore, actor D is a very important actor in this service ecosystem. To evolve and gain viability, service systems need to include this type of actor.

2.5 Learning capacity

The capacity to become vital to the service ecosystem, defined by Lusch and Vargo (2014) as the learning capacity, may be potentiated through a sparse network with structural holes because that network configuration allows actors to have access to recourses that are away from its close relations. However, this only happens if these type of actors have high betweenness centrality, which represents the proportion of flows mediated by these actors. This would be the case, for example, of actor C and D. These actors facilitate information and have great power in the network, because other actors can depend on them and gain access to connections of power. They therefore can improve their resource integration capacity, especially in terms of complementary resources, and become fundamental in terms of maintaining and improving the service ecosystem viability. In more closed networks, actors are close linked among them, flows of information and knowledge are accessible and runs quickly among all members of the networks, but information becomes redundant. In this sense, to become vital to the systems an actor needs to reach actors belonging to other networks or service systems.

With a consideration of the necessary competences for value co-creation suggested by Lusch and Vargo (2014), namely, collaborative process competency, adaptive and absorptive capacity, resource integration capacity, and learning competency, we can make an association between the accessibility of certain resources and the improvement of certain capacities that allow for a collaborative advantage that can create value as can be observed in Figure 1.

3. Implications

As Lusch and Vargo (2014) mention but not elaborate on, collaborating with other actors by getting access to and drawing on operant resources and service exchanges provides a collaborative advantage that can lead to strategic benefits and improved system viability. To obtain collaborative advantages, actors must improve their collaborating skills and their adaptive and absorptive capacity, including resource integration and learning abilities.

We have zoomed in on social capital, portrayed as a category of resources embedded in networks, understood as service ecosystems, and shown how dimensions of social capital influence the actor's ability to improve collaborative advantage. Depending on the structure of the network (more closed or open) and the position of an actor, the actor's collaborative advantage changes. Therefore, actors search for the best combination of positions and network structures, according to their goals, to maximize their strategic benefit in terms of co-creating value.

As was shown, the network configuration and the actor position in the social relations structure, influences the access to and the type of resources actors can have. This is an important input for service focused marketing practitioners.

As stated by Vargo and Lusch (2016), in S-D logic, companies cannot provide value for their customers, but they can make value propositions and participate on value creation. In this line, their role is to facilitate their customers' capacity to extract value. From a firm lens, this systematization helps to understand their customers' communities. Within customers communities there are actors with prominent positions within the community, and therefore essential for the community survival. It is important to understand the community social structure so that actors that bridge between groups can be provided with information and resources that can be spread across groups. This would benefit the individual actor, but also, the entire community.

At the same time, understanding the network type becomes relevant also. By understanding which type of network the community represents can help the firm to help developing trust and cooperation, when needed for actors to exchange and integrate resources. In addition, identifying which types of resources the community seeks, complementary or redundant helps to provide the necessary support to community members, something that will help them to achieve maximum density or collaborative advantage.

Looking ate the individual actors firms need to understand how they can help their customers enhance their co-creation process and value. To achieve collaborative advantage, customers need to belong to social structures that provide them social capital and its inherent resources. Therefore, firms can help their customers to rise their social capital by providing opportunities to relate with other consumers, sometimes of different service systems so that the customer can have a "big picture" and understand what other resources are available and how he can integrate them with his own in order to create value for him and the entire system.

Acknowledgements

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Parental Labour in the Development of Individual Intellectual Capital: The Russian Case-Study

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Abstract: The primary bearer of intellectual capital is an individual. In the structure of intellectual capital researchers distinguish human, relational and emotional capitals. They are primarily cultivated in the family during the process of parental labour. It is becoming more popular in Russia to declare a labour nature of parenting. These days family performs as a full-fledged entity of national economy and is responsible for the development of future intellectual capital. The research presents a case-study which aims to resolve one of the issues related to the process of development, namely to identify the possibilities to include the parental labour into the legislative regulation as a type of labour which targets the individual intellectual capital formation. The article suggests the results of systematic analysis of current Russian legislation on the family relations and pensions. We used the following sources: the Family Code of the Russian Federation; federal laws on pension provision; by-laws. The results are as follows: firstly, there is a correlation between the emergences of parental obligations and children responsibilities to care about elderly parents. Secondly, we have revealed an existing legal regulatory mechanism of parental involvement in the formation of children intellectual capital, though it is not developed enough. Thirdly, we have identified the possibilities and restrictions of parental labour results, which are considered in the pension provision. Fourthly, the existing legislation allows to develop a legal regulatory mechanism of the pension provision of parental labour. The results show that the parental labour can be regulated by the current Russian legislation because it includes required legal constructions. Integration of parental labour into the legislative regulation will allow parents to have a strict focus on the formation of children intellectual capital. At the same time, the optimisation of aforementioned processes at the family level will provide conditions for quantitative and qualitative improvement of intellectual resource at both regional and national levels.

Keywords: individual intellectual capital, parenting, investment in the individual intellectual capital, parental labour, legislative regulation of parental labour

1. Introduction

The primary bearer of intellectual capital is an individual. As is often the case, researchers investigate the intellectual capital of a business rather than that of an individual. Yet some research works deal with the influence of individual intellectual capital components on the innovativeness and consequent growth of a company (Omerzel and Jurdana, 2016), correlation between intellectual capital of an individual and that of a company (Vale, Branco and Ribeiro, 2016), measuring the intellectual capital of particular occupational group (Sultanova, Svyatov and Ussenbayev, 2018; Naidenova et al, 2015) and the like.

Researchers view the structure of intellectual capital differently. For instance, Edvinsson and Malone consider it as a combination of human and structural capital (Edvinsson and Malone, 1997), for Bontis and Stewart intellectual capital includes human, structural and customer capital (Bontis, 1998; Stewart, 1997), whereas for Saint-Onge and Roos with his co-authors intellectual capital is a unity of human, structural and relational capital (Saint-Onge, 1996; Roos et al, 1998), and the like.

Our research is based on the conception that primarily elements of individual intellectual capital are developed within family. First and foremost, family plays a pivotal role in the development of human capital at the individual level, which researchers refer to as "the heart of Intellectual Capital" (Hejase et al, 2016). Family provides a bearer of human capital with knowledge, skills, abilities, health and motivation. In relation to other social institutions, the role of the family is fundamental, as it lays the groundwork for the performance of other institutions and predetermines the nature and efficiency of developing the human capital in whole. Secondly, those values which are mainly inculcated into a child by the family subsequently become the pillars for developing the structural capital, which comprises corporate culture, management philosophy and the others. Thirdly, family is significant for relational capital formation, which cannot be developed without individual soft

skills. We should mention, that Navarro, for instance, refer to effective social skills, professional commitment, and leadership values as parts of individual soft skills (Navarro, 2008), whereas for Massaro and his colleagues they comprise ideas creation ability, coordination ability, planning ability, learning ability and the like (Massaro et al, 2014). Development of all these skills should begin at an early age. In this account, Lepeley and Albornoz consider it central to the demands for people and soft skills in labor markets of the 21st century (Lepeley and Albornoz, 2012).

We believe, that the process of individual intellectual capital formation within the family is per se the parental labor. We consider parenting as a respectable labour, which aims to solve an important state task – the formation and development of the highly valuable intellectual capital. This type of labour should be remunerated, and the recipients of such payments should be the subjects of parental labour, who qualitatively perform parental labour functions. From our point of view, parental labour in general is the activity aimed at the birth, care, upbringing of children, formation of their intellectual capital, which is carried out in the family. In our previous studies, we have already substantiated the labour nature of parenting, as well as its compliance with all the characteristics of labour (Bagirova, 2017). International studies also confirm this. In particular, researchers who study the division of domestic work in a family speak indirectly about the labour nature of parenting (for example, Dribe and Stanfors, 2009).

We believe that payments to families with children should differ from benefits, which are spread worldwide. It is known that benefits are monetary assistance provided by the state to the people in difficult financial situation. Benefits are a form of social welfare of the population. They are paid primarily to ensure the minimum livelihoods of the part of population which is unable to work.

It is becoming more popular in Russia to declare a labour nature of parenting. The requirements imposed on children as future members of society are constantly growing. Parents have to spend more time and money on children. These days family performs as a full-fledged entity of national economy and is responsible for the development of future intellectual capital. The research presents a case-study which aims to resolve one of the issues related to the process of development, namely to identify the possibilities to include the parental labour into the legislative regulation as a type of labour which targets the individual intellectual capital formation.

2. Data and methods

We used two levels of information sources for the analysis:

1. Federal legislation:
1.1. Family Code of the Russian Federation (Russian Government, 1995);
1.2. Federal laws on pension provision:

- "On insurance pensions" (Russian Duma, 2013a);

- "On state pension provision in the Russian Federation" (Russian Duma, 2001);

- "On funded pension" (Russian Duma, 2013b);

2. By-laws (Russian President, 2006; Russian Government, 2014).

In the family legislation, we analyzed the provisions defining the scope of rights and responsibilities of parents, as well as of adult children in relation to disabled parents. We identified the basis for parental responsibilities and responsibilities of adult children to disabled parents. In the pension legislation, we were interested in the aspects regulating conditions and procedure for the pension provision to persons caring for elderly parents. We analyzed the grounds for additional rights to the pension provision for persons, who care about elderly parents. We applied methods of comparative law, legal interpretation, as well as legal forecasting and legal modeling.

3. Results

The main results of our study are as follows.

1. There is a correlation between the nature of parental responsibilities and the responsibilities of children in caring for elderly parents.

Firstly, conscientious fulfillment of parental responsibilities is a prerequisite for the subsequent emergence of children's responsibilities in caring for elderly parents (Russian Government, 1995, part 5, article 87). The established link indicates the common nature of such responsibilities.

Secondly, the fundamental principle of family law is the source of these responsibilities. This principle is based on the need to strengthen the family, to build family relationships on feelings of mutual love and respect. In addition, the goal of family law is to ensure the priority protection of the rights and interests of minors and disabled family members (Russian Government, 1995, article 1).

The relation of parents' and children's responsibilities on various grounds is presented in Table 1.

Table 1: Similar attributes of parental responsibilities and responsibilities of children in caring for parents

Attribute	Parental responsibilities	Responsibilities of children in caring for parents
Source of information	Article 63 of the Family Code of the Russian Federation	Article 87 of the Family Code of the Russian Federation
Unity of the nature of occurrence	conscientious fulfillment of parental responsibilities is a condition for the emergence of the responsibilities of children	
Underlying principle	the need to strengthen the family, to build family relationships on feelings of mutual love and respect, mutual assistance and responsibility of all family members	
Type of activity	The main activity of a citizen	
Declarative character	Provided	
Social significance	High	

Source: Results of the authors' analysis

The fact that responsibilities of parents to children and responsibilities of children to elderly parents have a single source of emergence suggests the use of a single method of legal regulation. Such an approach indicates the possibility of applying the provisions, which regulate some of the legal relations to others and vice versa, by analogy of law and analogy of statute.

At the same time, we identified certain differences in the legal regulation of responsibilities of children and parents in Russia. They are presented in Table 2.

Table 2: Differences in the legal regulation of parental responsibilities and responsibilities of children in caring for parents

Attribute	Parental responsibilities	Responsibilities of children in caring for parents
Grounds for the emergence of responsibilities	birth of a child	disability of parents and their need for care
Indicators of diligent performance of responsibilities	period of time spent on care and upbringing, labour productivity indicators	

Source: results of the authors' analysis.

Differences between the two types of legal relations, which are presented in table 2, should determine the specifics of the pension provision of parental labour.

2. The analysis identified a mechanism of legal regulation of parental activity in the current Russian legislation. At the same time, the scope of legal regulation of this field is small and limited.

The existing mechanism of legal regulation of parental labour can be divided into two interrelated blocks. The first one is the Family Law. It defines the scope of parental rights and responsibilities towards children and establishes a measure of the legal liability of parents for the inappropriate performance of parental responsibilities. The second block – Pension Law – contains a number of provisions describing how the

performance of parental functions is taken into account when calculating the insurance period for determining the amount of pension payments (Russian Duma, 2013b, paragraph 3, part 1, article 12). Our analysis showed that time spent on parental labour is not included fully in the insurance period that determines the size of pension payments. There are the following limitations in Russian legislation at the moment:

- 1) the insurance period takes into account the period of a child care by only one parent;
- 2) the parent's insurance period takes into account the period of a child care only in the first year and a half of a child's life;
- 3) 6 years is the maximum period of time spent on parental labour in the insurance period.

Thus, the current legislation regards parental labour solely as caring for a child under 1.5 years old, by one parent, without imposing requirements on the quality of parental functions performance.

3. Both the possibilities and limitations of accounting for the results of parental labour in the pension provision are identified in Russian legislation.

The possibilities include the following:

- current legislation regulates legal relations arising from parental labour;
- there is a legal liability for improper performance of parental responsibilities;
- there is a potential to take into account the results of parental labour in pension provision;
- there is a possibility of taking into account the results of parental labour, by analogy with the responsibilities of children in caring for elderly parents.

The limitations are associated with the following:

- legal regulation of parental labour takes into account mainly time costs and does not include the material costs associated with the execution of the parental function;
- there are no indicators that directly measure the labour costs of parents in relation to the actual achievements of children.

At the same time, the structure and fundamental principles of the current legislation in this area do not hinder the expansion of legal regulation of parental labour in terms of establishing additional pension provision guarantees. There is a possibility of improving the current mechanism of legal regulation without changing the existing norms and institutions. It can be achieved through the reception of legal constructions, which are already used in determining the pension provision of persons caring for elderly parents.

4. Discussions

The issue of scope and quality of intellectual capital is currently given the priority not only in Russia, but also in the European countries with similar demographic tendencies. For instance, the mortality rate in Russia has been exceeding the birth rate for two years; Russian population forecasts are extremely pessimistic. The official projected dynamics of the Russian population is presented in Figure 1.

In the long term the issue of the scope of intellectual capital will be more ostensible. According to the official Russian statistics, the natural population decline will increase by 2 times (from 229 thousand people to 455 thousand people) in 10 years (from 2018 to 2028). The highest rate of population decline is projected to occur in the nearest future – from 2019 to 2021 (approximately 20% each year).

The situation is similar in most European countries. For example, Bleha and co-authors describe the prospects of depopulation and population aging in the Czech Republic and Slovakia (Bleha et al, 2018), Ainsaar speaks of a critical demographic situation in the Baltic countries (Ainsaar, 2019), Pires De Almeida – in Portugal (Pires De Almeida, 2018), and the like. Negative demographic projections, expected population aging, low reproductive attitudes of youth, inefficiency of the "mechanical" transfer of experience in solving similar problems by other countries – all of this is forcing the Russian leadership to look for new measures aimed at increasing the birth rate and improving the quality of national human capital. Currently, these measures are primarily economic.
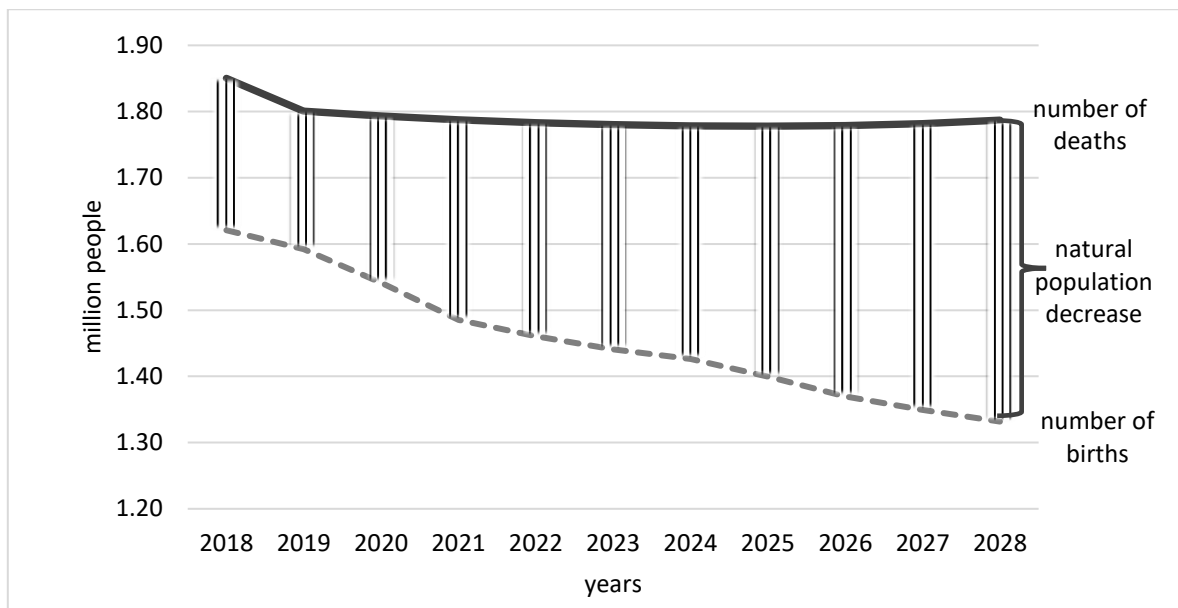
Figure 1: Projected dynamics of the Russian population, million people (average variant of the forecast)

We believe that the development of national intellectual capital cannot be pursued by economic measures only. It is important for government to project that parents, who spend time, money and put a lot of effort into versatile development of their children, fulfill a significant social objective. Parallel to this, the state should admit the labour nature of parenting and establish mechanisms for increasing its effectiveness. Furthermore, the existing Russian legislation provides an opportunity to develop a mechanism of legal regulation of pension provision for parental labour. According to the results of our analysis, we have formulated the basic principles on which such a mechanism should be based:

- recognition of parental labour as a citizen's main activity to be accounted for when calculating pension payments;

- recognition of the high social importance of parental labour and measures for individual intellectual capital development, which necessitates full state regulation of parental labour sphere;

- recognition of the declarative nature of parental labour: citizens can claim to receive payments and account for the parental labour period after contacting the pension fund with the appropriate application.

The specificity of parental labour in comparison with caring for an elderly parent is that the primary purpose of parental function is a child's upbringing and full development, not the provision of the most comfortable living conditions for a child. Accordingly, the proposed mechanism of legal regulation should aim not to induce parents to perform their responsibilities in good faith, but to encourage them to implement their parental function as the main one, replacing any other labour with it. In our opinion, the main task of the mechanism of parental labour legal regulation should be to reduce the financial burden (current and subsequent, due to a decrease in the insurance period), which inevitably arises from the need to quit in favor of raising children.

Parental labour targets the development of child's intellectual capital, thus it is advisable to introduce a system of stimulation for parents in the mechanism proposed. We believe that diligent performance of parental functions (for example, children achieving significant results in school, sports, art and other fields) should be rewarded. Such incentives may include accruing additional pension points. On the one hand, this will encourage parents to choose parental labour as their main activity, which will guarantee a sufficient pension provision. On the other hand, it will help ensure the predictability of the load on the budget system through long-term planning of the size and source of pension payments.

In proposing the development of a "payback" mechanism for parental costs, we considered that children have always been the main support system of their elderly parents in traditional societies. According to Vishnevsky, who referred to the XIX century Russia, "the perception of the unlimited rights of parents towards children and the equally unlimited responsibilities of children towards parents was deeply rooted in the popular consciousness" (Vishnevsky, 2006). The family was extended and consisted of several generations; all its

members lived together, and the younger ones took care of their elders in various forms. However, the situation is changing in modern societies. Australian demographer J. Caldwell notes: "The intergenerational wealth flow, which is directed from the younger generations to the older ones in all traditional societies, changes its direction by 180 degrees in modern societies, resulting in a loss of parents' interest in having children" (Caldwell, 1976:345). The economic effect of having children is historically decreasing and transforming into other, weaker forms of this effect. Becker and Murphy note that nowadays "most societies have social "norms" which force children to support elderly parents (Becker, 2003:447-448). Although little is known about how these norms are formed, they are most likely much weaker in modern societies with the anonymity of urban life and the mobile population".

We assume that the detailed development and implementation of the mechanism of parental labour legal regulation may have the following consequences:

- 1. reducing the negative consequences of choosing parental labour as the main activity of children's intellectual capital development, which are currently associated with the inevitable decrease in the size of pension payments for the subject of this type of labour;

- 2. strengthening reproductive attitudes of youth and increasing the desired number of children among potential parents due to their understanding of the high significance of parental labour in society and the creation of various favorable conditions for it at the state level;

- 3. encouraging the most responsible citizens, who are currently refusing to have children for economic or other reasons, to become parents.

5. Conclusions

The formation and cultivation of children's intellectual capital require financial, moral, labour and time costs. The governmental structures tend to ignore the parental labour. Consequently, its results are poorly estimated by both government and organisations (the main consumers of parental labour results). Our study is the first attempt to analyse the possibilities of legal regulation of parental labour in Russia. The results are as follows. Firstly, the need to include parental labour in the field of legislative regulation is based on the similar signs of parental responsibilities and responsibilities of children in caring for their parents. At the same time, there is a pension provision for children cari.ng for elderly parents, but there is no pension provision for parents implementing parental labour. Secondly, Russian legislation is currently susceptible to the regulation of parental labour. It contains legal constructions that are ready to implement the provisions concerning the regulation of this type of labour. At the same time, the legal regulation of parental labour with its prior state task to form the children's intellectual capital is not present these days.

We firmly believe that the integration of parental labour into the legislative regulation will offer an opportunity to parents for having a strict focus on the formation of children's intellectual capital, which is one of the priorities of parental labour. At the same time, the optimisation of aforementioned processes at the family level will provide conditions for quantitative and qualitative improvement of intellectual resource at both regional and national levels.

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Making Videos as a way of Learning: A Project at the Engineering School of Padua University

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Abstract: In higher education, learning involves many capabilities and requires active participation and contribution by learners. Indeed, the types of jobs that appear every day have new knowledge requests and learners must become active creators of their personal knowledge, individually or in collaboration with others. Methods of active teaching and learning practices are becoming popular, even in science and engineering where, traditionally, teaching is mostly based on classic lecturing. This paper examines the implementation of a project of an innovative form of learning that was proposed to students in the School of Engineering at the University of Padova (Italy). Students were asked to perform a teamwork consisting of some original research on a topic and its presentation in the form of a video. The study describes the implementation steps and the results of this project and shows how this approach can represent an active modality for learners who can construct their own knowledge, integrate different forms of knowledge, and explore new communication channels that also imply various processes of knowledge conversion. Suggestions for a future development and replication of this activity, as well as discussion of critical issues, are finally presented.

Keywords: active learning, higher education, knowledge conversion, video-making, design-based research, university course

1. Introduction

It is now widely recognized that, in higher education, learning involves many capabilities, requires active participation and contribution by learners, and is also based on individual and social experience of "what is being learned" (Merriam and Bierema, 2013). Indeed, the new types of jobs that appear every day, with their new knowledge requests, lead to switching the focus on learners from purely passive "acquirers" to active "creators" of their personal knowledge. In addition, in our complex societies, very rarely a person has "all the knowledge that is required" to face a real situation: collective learning processes are needed, where people work together, develop shared communication languages, and make decisions with others. For specular reasons, the job of educators implies complex cognitive processes (Ratcliff-Martin et al., 2000; Stevenson, 2000): the role of an instructor is that of helping learners to receive and process knowledge contents, activate autonomous learning processes, and build their own knowledge base that will be helpful for their professional career or their life. Methods of active teaching and learning (Merriam and Bierema, 2013) are becoming popular, both in humanities or social sciences, and in "hard sciences" and engineering (Freeman et al., 2014).

This paper examines the implementation of a project of innovative learning that was proposed at the School of Engineering of the University of Padova (Italy). Particularly, students were asked to perform a teamwork activity with the purpose to edit and film a presentation where they illustrate a specific engineering problem and provide their ideas and prospective solutions. The paper describes the implementation and the results of this project and shows how this approach can represent a change from a learning process mostly based on a process of pure transmission of knowledge from "teachers" to "learners" (as passive receivers), to an active modality where learners construct their knowledge. Suggestions for a future development and replication of this activity, as well as a discussion of critical issues, are also presented.

2. Background

Active learning is defined as "any instructional method that engages students in the learning process" so that they "do meaningful learning activities and think about what they are doing" (Prince, 2004). This contrasts with traditional lecturing where students are expected to passively receive elements of knowledge from an instructor. Although the introduction of active learning methods in University courses has both advocates and opponents, there is evidence that they can increase student performance (Freeman et al., 2014). Generally speaking, active learning can include different practices. In this paper, the interest is in in collaborative and cooperative learning techniques, where student interact rather than learning solitarily and individually.

In this study, a Knowledge Management (KM) perspective is adopted because it can help to understand the efficacy of approaches to teaching and learning (for a survey, see Bolisani, 2019): how teaching and learning methods can be innovated and improved, how knowledge creation, development, and exchange can be facilitated, how active participation of learners and teachers is triggered. Specific active learning methods have been analyzed by using a KM perspective, e.g.: case-study discussions (Fink, 2012), simulation and games (Martin and Aznar, 2017), class work (Marin-Garcia et al., 2014), storytelling (Jørgensen, 2018), and e-learning tools (Maabreh, 2018). KM models can help understand the learning processes and knowledge conversions that come into play in active learning, the effectiveness of communities of students working together, the efficacy, and finally the problems of knowledge transfers and sharing.

As a teaching/learning approach, video-making falls into the category of "engaging assignments" (Fiorentino, 2004). Students are required to demonstrate academic knowledge and abilities, and to connect various sources (i.e.: course materials, personal readings, independent research, etc.) for addressing a practical problem by critically reflecting, evaluating, and presenting the results of their own analysis. This approach differs from other "traditional" assignments (like, e.g., written reports) and is not simply "recording opinions or statements" but, rather, a demonstration of a capability to engage with existing materials and to present fresh reflections so that this can expand the knowledge that can be learned inside class lectures. In addition, students are required to go beyond their "comfort zone" of their usual university experience and this can enable new forms of learning.

According to Malisius (2016), there are some conditions for a successful project of video assignment in a university course:

- students are not expected to produce "a fictional movie", so videos should be an alternative "visually narrative form" of some specific academic topic

- basic guidance in video production may be helpful, because often don't know this communication form

- open-ended assignments are appropriate, because they leave space for the creativity that is compatible with video production

- assessment should consider the efficacy of presentation in accordance to the academic purposes and standards

Based on that, the learning functions of a successful video assignment can be summarised as a "virtual cycle" (figure 1) as follows:

- assignments remain open-ended or in vague terms, which fosters creativity in research of explicit or tacit knowledge elements, their re-formulation and re-formatting, and their proper inclusion in a video format

- in turn, creativity will help students to feel out of their "comfort zone", so that new learning and KM processes will be activated

- being out of a comfort zone will induce students to "work together" and seek the creation of a "community of learners" where they can share knowledge and help each other

- community can help collective learning processes where, in turn, the knowledge created and manipulated will be more easily shared and assimilated by the individual students

- learning processes activated in this way may help students to engage in reflective practices about what they are doing, why, how they are going to present their results, what knowledge they are seeking, producing, and manipulating, etc. In short, improved awareness of their collective and personal KM and cognitive processes.

3. Goals and approach

The goal of this study was to design an educational action aimed at improving the capability of students of an engineering course that need to learn how to handle a complex issue and to present the results of their work properly. The basic idea is that, for their profession, they need to: a) tackle tasks with open goals not clearly defined, so that they can't automatically apply standard methods or procedures that have been learnt during lectures; b) work in collaboration, so that they need to interact with others and find an appropriate subdivision of tasks; c) reflect on the way they can communicate the results of their work, and d) apply new communication methods. The project was intended not only to experiment a new teaching/learning method but also to advance

our knowledge about the characteristics of these actions, the KM processes involved, and the key points of their design and implementation.
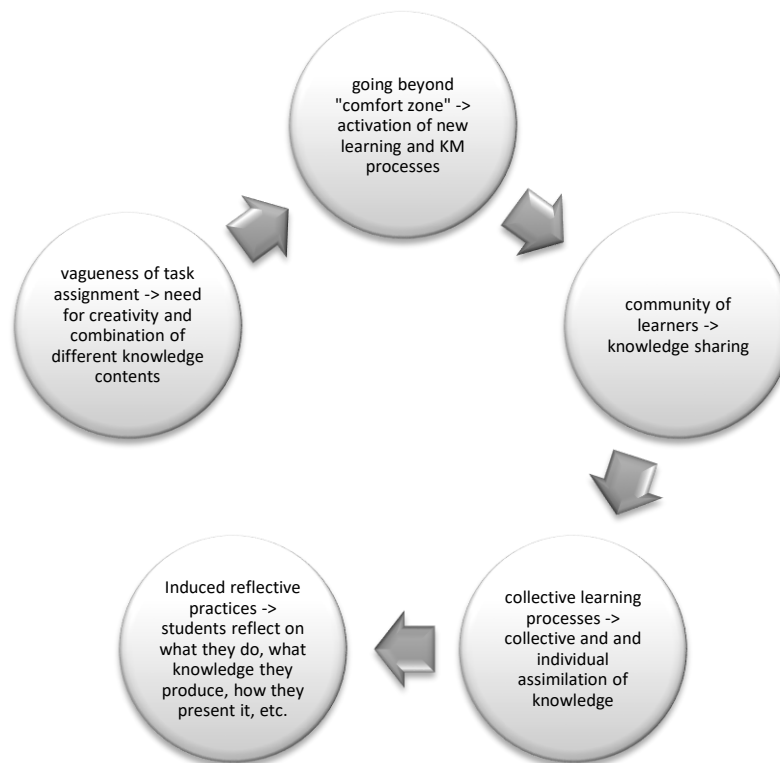
Figure 2: KM virtual cycle of a video assignment

For the purpose of this study, a "design-based research" approach, which is gaining popularity in education, was adopted. The main purpose of design-based research (Alghamdi and Li, 2013) is to address complex problems in education and to build stronger connections with real-world problems. Experimenting new educational actions can help understand their training efficacy and to derive "design principles" for their replication in other classes and/or contexts. The approaches to design-based research can vary, but these steps are generally included (fig. 2).

Figure 2: Steps of design-based research

- *Needs and context analysis*, where the educational problem, its origins, and the consequent educational goals are identified and situated in the specific case
- *Design of the educational intervention*, i.e.: adoption appropriate conceptual references, selection of methods and tools, decision of steps and timeline
- *Implementation and experimentation* in a specific class
- *Summative evaluation*, with the purpose to understand the efficacy of the intervention and possible suggestions for future replication

4. Description of the project

4.1 Needs and context analysis

The educational intervention was promoted in Academic Year 2018/2019, in the context of a project funded by the University of Padova and aimed at improving the quality of teaching and learning. This particular action

regarded a course of "Innovation Management" for the post-graduate diploma in "Engineering Management" at the School of Engineering. The course, delivered in Italian, aims to provide essential knowledge of concepts and methods of technology management and innovation strategy planning. Students are also expected to acquire competences that are necessary for taking essential decisions in companies and organizations, with reference to technological innovations, R&D management, technology portfolio selection, project management, and related issues. Students have also to learn how to cope with problem solving in real-life situations. Particularly, one of the competencies that they develop is to conduct research autonomously for preparing a preliminary report about a potential technology that can be of interest for a specific business. In innovation management, this activity is generally known as an exercise of "technology monitoring" or "technology scouting".

Seen from a KM viewpoint, this work implies that:

- students reflect on their basic element of "prior" knowledge of a technology which is, for the rest, mostly unknown to them. This prior knowledge will guide further research and learning processes about the technology itself;

- students must be able to understand the task that will be assigned to them. This task requires elements of different knowledge (i.e.: kinds of innovations and innovation strategies, business value of innovation, issues of innovation management in business) and competencies (i.e.: how to understand the technical problems in the development of an innovation, how to assess the economic implications of an innovation, how to formulate goals of a business plan);

- students must also convert pieces of tacit knowledge they may have, into explicit knowledge (for example, keywords) to be used in search engines of databases, websites, and other electronic sources;

- Students must also learn how to use different sources of knowledge, both in electronic form (for example: patent databanks, repositories of scientific literature, websites of economic statistics, etc.) and in traditional form (for example, written reports and books, but also experts that can be consulted in person or by email);

- Since each student may not possess all the knowledge that is necessary for the task, they need to interact, learn from one another, and combine their respective knowledge, which is also a typical situation that reflects real life;

- Students must be able to perform a transfer of knowledge towards a potential audience, namely, to implement a proper presentation of their findings and prospective solutions, which is also an important professional skill.

4.2 Design of educational intervention

In accordance to what mentioned in section 4.1, the designed intervention intended to allow students learn how to implement the concepts and methods of technology monitoring by simulating a real case of application. Students were asked to simulate their work as "assistant strategists" in a firm, and in particular:

- collect information about the "state of the art" of some promising technology, with the ultimate purpose to help understand its business potential for formulating strategic decisions of a hypothetic company, regarding innovation projects, R&D investments, project planning, business plans, etc.;

- describe the technology by adopting some typical classifications generally used in innovation management;

- describe the "technical problem" and/or the "technical features" of the examined technology;

- analyse the features of that technology, including plausible forecasts about future trends of research and economic applications (i.e.: prices, demand, incentives, etc.);

- formulate arguments about the competences and resources that a company may need to develop that technology, the possible problems, the need for collaboration with other organizations (i.e. business partners, university labs, etc.) and its pros and cons;

- formulate possible options in terms of the innovation strategy of the company in question.

This work needed to be performed in group, i.e. students had to form a project team. There were some specific prescriptions regarding the final output, namely, the teams had to present their work in the form of a video. This choice was done for the reasons already presented in section 2 and namely:

- moving students away from their "comfort zone" as regards the usual academic presentations, so that they were forced to make new reflections on the specific mechanisms of knowledge research, selection, processing, and communication. This can be particularly challenging for students of engineering, who are generally used to reasoning in a highly structured and logic-based way

- helping students to engage in teamwork for dealing with an "unusual" task, which again may challenge the approach to academic study they are accustomed to, and force them to see problems from a new perspective

- finally, helping students to get more used to a new form of communications (i.e.: video messages), so that they can become more able to interact with other professionals they can encounter in their future career (i.e.: advertising specialist, video-makers, etc.)

The assigned tasks also had some specific prescriptions:

- there was freedom of use of any filming and footage technology, as well as communication style; it was preferred not to provide indications about how to create a movie, because the goal was to see how students would have faced this challenge

- conversely, suggestions were made about what main contents should have been considered for inclusion in the presentation, although an overall flexibility was also allowed

- there was a maximum duration of movies (15 minutes), to force students to select knowledge contents and assess their importance for the goals of their presentation

- all team members were expected to appear (in person or voice) in the video presentation for a reasonable time

4.3 Implementation and experimentation

The implementation of the intervention can be described by referring to the timeline shown in figure 2.
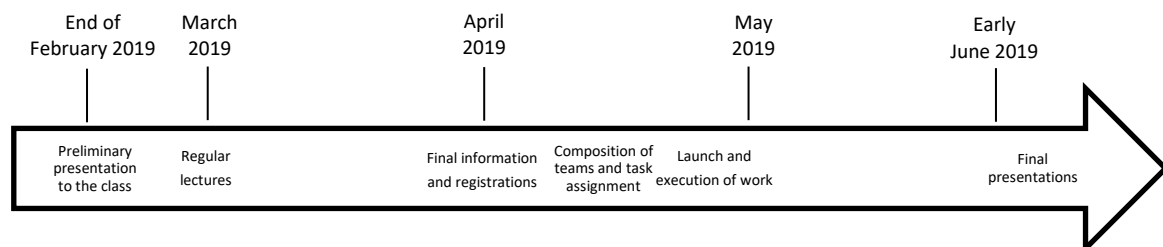
Figure 2: Timeline of the activity

- *Preliminary presentation to the class*. The task was presented at the beginning of the course (end of February 2019). The activity was proposed as optional, because attendance of lectures is not mandatory, and the proposed activity was substantially experimental. In any case, the activity was reserved only to students attending a minimum number of lectures. Also, it was agreed that students engaging in the project would have this work considered as part of their final assessment (in replacement of the regular oral exam).

- A pre-registration was made, just as a sort of "manifestation of interest", to estimate the potential number of interested students. Approximately 40 students (about 40% of regularly attending students and 1/3 of the total number registered in the course) signaled their interest.

- *Lectures*. Between end of February and last week of March, lectures went on as usual. Various lessons regarding basic concepts, classifications, and methods for innovation management were delivered. These topics are particularly important because they concern elements of knowledge that would have been particularly useful for the video assignments (i.e.: conceptual knowledge: classification of innovations, technology strategies, planning options, etc.; and methodological knowledge: how a technology monitoring can be conducted, a patent database can be searched into, etc.).

- *Final information and registrations.* At the end of March 2019, a final presentation of the activity was made during a class: at that time students had enough knowledge of the basic topics of the course for deciding if they liked the proposed activity. Clarifications were provided especially about: task goals, requested

approach, modalities, deadlines, and validity in replacement to the final exam. By 30th March, registrations were collected by means of the e-learning platform used in the course (Moodle). Finally, 29 students enrolled, which is about 25% of the total number of students regularly attending.

- *Composition of teams and task assignment.* Afterwards, students were invited to compose their own groups, with a maximum of 4 people each. A couple of students joined no group voluntarily, so they were assigned "ex officio" to a team. In the end, there was a total of 8 teams, 3 with 3 members, and the others with 4. In the middle of April, all teams were briefed after a class, and tasks were formally assigned, in the form of two written forms, one containing general instructions and the other a specific description of the team goal. Table 1 shows an example of this last form. Teams had to imagine being part of a strategic management office of a different company, and they were required to conduct a study as indicated in the form. Similar tasks were prepared for teams (and randomly assigned), with some differences from one another regarding the kind of technology to examine and the company to simulate. Tasks were described in a sufficient detail so that the students can have an idea of the real-life case that was being considered, but at the same time they were general enough to represent an open problem with no deterministic solution, so that personal interpretations and creativity could be developed.

Table 1: An example of assigned task (translated from Italian)

GROUP X: YOUR TASK

Imagine that you are part of the strategic management office of a company, and your task is to provide information for executives to take appropriate decisions. This is the description of your company and your task: *One of today's problems of electric power generation by using solar cells is energy storage. A company that manufacturers solar cell panels for industrial use is considering the future options in the field for a possible production of a complete production-storage system to sell on the market. In case, possible collaboration with other specialized business partners may be considered. The company aims to assess the state of the art of technology and the prospects of this industrial sector, for formulating a possible technology strategy.*

- *Launch and execution of work. Final presentation.* Teams had approximately one month and a half to do their research, analysis, and video-recording. Teams worked autonomously, with the exception of rare questions and requests of clarification. At the beginning of June, a special session was organized for the video presentations in front of the instructor and the other student teams. Each video was followed by a feedback and/or question by the instructor. Finally, all students were given a written "Certification of Completion" and were asked to compile a feedback questionnaire on the activity. Teams were also invited to upload their video in the course e-learning platform (based on Moodle technology) for the benefit of other students. 5 teams accepted this invitation.

4.4 Summative evaluation

At the launch of the activity and during the teamwork, qualitative feedbacks were collected in the form of questions asked by students, which gave an idea of some key problems and concerns. In particular, the following points were raises:

- kind of knowledge requested about the company at which the students should simulate to work (i.e. sector, business, structure, etc.)

- kind of knowledge that teams were supposed to collect about the technology, and the form in which this knowledge should have been presented

- especially, how videos should have been made (i.e. what modality, style, etc.), what technology should have been used, and the purpose itself of making a video instead of a traditional presentation

At the end of the teamwork, during the final presentations of the videos, a qualitative assessment of their effectiveness and quality was possible. It resulted that:

- teams used different communication styles: some just presented a traditional slide presentation, but video-recorded; some others added graphics and animations (newly created, or downloaded by the Internet), headlines, etc.; a few others even created a short "TV program" with simulated interviews and journalistic reports

- effectiveness of communication was, generally, higher than a normal presentation. All teams made efforts to remain within the target time. The necessity to talk in a video induced students to take care of details scrupulously, by carrying out trials and preparing texts in advance. Apparently, and contrarily to what may be expected since it was a video, all this implied a process of preliminary knowledge conversion into an explicit form that might be more easily understood by an audience. Every detail of communications was planned in advance, and there was no chance to transfer knowledge by means of real-time interactions, questions, feedbacks from the audience, etc. In any case, the efficacy of communications varied from case to case, depending on the communication style and the filming technique they adopted. Figure 3 shows some examples of different communication styles adopted by students.

- it was likely that engineering students didn't have any particular skill in video making and communications – and actually, it was intentionally decided not to provide them any specific training. Quality was, however, good enough, as well as the video techniques used were not banal. In short, students performed a self-learning process to understand how to use videos properly for the assigned task

- On the other hand, in some cases students focused more on making nice videos rather than on providing appropriate quality of contents and they neglected important elements (precision of details, reliability of sources, etc.). To an ingenious look, this video modality should have resulted in a transmission of "imperfect" elements of knowledge.
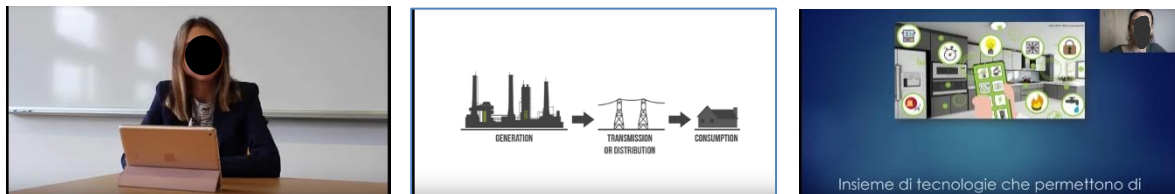
Figure 3: Three examples of different communication styles adopted by students (nb: faces have been disguised for reasons of privacy)

After the presentations, students were invited to compile a feedback questionnaire. 24 out of 29 students accepted. Results are presented in table 2.

Table 2: Students' feedbacks

Questions (nb: responses range from 1=don't agree to 5=completely agree)	average	Median
The proposed task was clear	4,42	4
The proposed task raised my interest	4,71	5
The proposed task helped me to understand theoretical knowledge of the course	4,25	4
The proposed task helped me to understand practical knowledge regarding the course	4,35	5
The proposed task helped me to integrate my knowledge with other topics I had not considered before	4,00	4
The proposed task helped me to work and engage with others	4,58	5
The materials provided/used (literature references, databases, etc) were easy to download, access, etc.	3,54	4
The materials provided or used were clear and easy to read, understand, employ, etc.	3,79	4
The materials provided or used were a useful support for the task	4,21	4
This activity should be proposed again (to next year's students)	4,83	5

As can be seen, generally speaking the activity was more than appreciated by students who largely propose to repeat it in the future courses. Also, the activity was considered useful for better understanding other conceptual or practical knowledge related to the course topics. The most critical points were the materials and tools provided for the exercise.

In addition, students were invited to submit short comments about their experience. Some student expressed appreciation: one wrote "*I appreciated the opportunity to make a video presentation. The topic was already interesting to me, but the video presentation made the research task nicer*" and another "*The activity was useful to make the course more practical. The idea of the video presentations was nice and stimulating: it must be proposed again in the future*" and a third one "*Nice activity, because it is different from the usual ones. Appreciable high level of autonomy*". In short, it seems that the idea of a video was nice because it involved different modalities of learning, knowledge production and delivery. Also, it was suggested to reserve a time slot

during the course for let all class attend the video presentations: "*It may be nice to show the video presentations to the other attending students, during the course (at the end of a regular lecture)*".

A student however reported a negative comment especially because the usefulness of making a video was not understood: "*I don't think that making a video is necessary for my professional future*". Indeed, some comments put an emphasis on critical points of the activity, especially the need for special training. One wrote "*It was unclear what making a video meant. We spent a lot of time to understand how to make a video*"; another said "*the task assignment was (maybe deliberately) vague. We had to make personal interpretations and assumptions for developing the project*". Other students suggested more guidance: "*We would have liked to have more interactions with the instructor during the project*" or a provision of examples: "*as this was the first year of experimentation, we lacked an example of video. I think that our videos will be of help for next year's students*" "*An example of how to proceed would have been useful*" "*It would be useful to have an example to understand how to develop the task*". Finally, the importance of the teamwork for the final exams was also a concern: "*Modalities of assessment were unclear*".

5. Discussion and conclusion

The experience was apparently much appreciated by students. The use of video making allowed students of engineering to complement their reasoning attitude and learning approach with other knowledge and modalities of communication. From a professional viewpoint, this is useful for their future job, although some students didn't recognize that. For a replication of this exercise, a suggestion is that this point must be better clarified.

The assignment also requested that the students apply the conceptual or methodological knowledge learnt during lectures to a real-life situation. Teamwork appeared useful to trigger collective learning processes, sharing ideas, and creativity for video making. A point to be considered is whether the students can be let free to build their own teams (as was done in this case), or to build teams according to some criteria. Another critical point is whether students should be provided with procedures and guidelines about what knowledge collect and how to integrate it in a video (which may however limit creativity) or they must be left alone (which triggers knowledge creation but may reduce efficacy of students' action). Based on the experience done, this is still an open and critical question. Indeed, some students signaled that they wanted more "training" about how to research contents, use knowledge sources, make videos, etc. However, the assignment requested that students integrate different elements of knowledge, some already learnt in the course, some that they needed to develop based on their "prior knowledge", and they had to do that in autonomy.

Particularly, students were expected to build their own skills in video making. It must be noted that the activity didn't prove to be particularly difficult as regards the choice and application of technical instruments (i.e.: video cams, footage software, etc.) that, indeed, are widely available today. The major problem was how to implement knowledge conversion processes appropriate to this communication channel: here, many students declared that they encountered some difficulty, also because they didn't have examples on which to base their work. Again, providing guidelines to be applied homogeneously by all students may reduce the problems of knowledge conversion but, also, creativity and self-engagement. In this experiment, students were left substantially free, which however led some of them to neglect the clarity and precision of contents. The lesson learnt is that students do need some minimum guidance – at least in general terms – for example in the form of an assessment checklist of "mistakes to avoid", or similar.

Implications for research. This study is substantially exploratory, but it provides ideas for further improvement. It may be interesting, for example, to test video making in other courses on different topics or disciplines which imply knowledge of other nature, and to check if the expectations, experiences, and results obtained by students change. Another option is to replicate the same experience but by involving students from the early beginning – i.e. at the design step, by adopting an "action research" modality.

Implications for the practice. The experiment provides food for thought regarding the use of video making in science and technical Universities, which can help the students to integrate their scientific knowledge with communication skills. A critical point is that this activity requires careful design and planning, which can imply for teachers some extra work.

Acknowledgements

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The Continuous Recombination of Codification and Personalisation KM Strategies: A Longitudinal Study

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Abstract: The notion of Knowledge Management (KM) strategy has long attracted the attention of scholars and practitioners. The literature provides evidence of different possible KM strategies. Particularly, an important distinction has been made between codification and personalization. While these can be seen to be alternative to one another, some studies argue that a company can follow a strategy that mixes the two approaches. The effective combination of personalization and codification may depend on the interaction of diverse factors, such as competition, leadership, politics, culture, technology. On this issue, however, the literature still provides mixed and sometimes contrasting results. Furthermore, available empirical studies are based on case studies of the KM strategic approach of one or more companies at a specific point in time. Instead, it may be interesting to check if conditions that change through time may also induce changes in a firm's KM strategy. This study aims to analyse how the mix of codification and personalisation can vary over time in the same company, due to changing organizational and environmental conditions. With this purpose, the evolution of KM initiatives of a multinational company has been investigated. The findings not only add to what already emerged in previous literature, but also better highlight the interrelations between the various factors that influence these changes. Lastly, the study raises the question of whether the classic distinction between codification and personalization strategies has still a practical usefulness or is just a simple abstract reference: this point can represent a fresh start of a future research agenda.

Keywords: KM strategy, codification, personalisation, case study, longitudinal study

1. Introduction

The notion of Knowledge Management (KM) strategy, intended as the *long-term planning of organizational, managerial and technical resources that a company employs for its KM programmes*, has increasingly attracted the attention of both academics and practitioners (Holsapple and Jones, 2006, Coakes et al., 2010). Even though its definition is still questioned (Shannak et al., 2012), this notion is used to categorise the possible approaches to managing knowledge that a company can follow. A popular classification distinguishes between codification and personalization KM strategy (Greiner et al., 2007; Ajith Kumar and Ganesh, 2011). Recently, it has been argued that the two approaches are not alternative, but, rather, complementary: a company can follow a mix of the two approaches, whose "optimal ratio" may vary in relation to several factors (Venkitachalam and Willmott, 2017). However, this issue deserves additional analysis: especially, the empirical studies are generally based on case studies of one or more companies at a specific point in time, while it would be interesting to explore the strategic combination of the same company over time.

This is the goal of this study: to analyse how the combination of codification and personalisation can vary over time in a company, and to investigate the organizational or environmental factors that can induce these changes. At this aim, the evolution of KM programs of a multinational company has been investigated. The findings make it possible to highlight the interrelations between the various factors that may induce a KM strategy change. The question whether the classic distinction between codification and personalization has really a practical application or is simply an abstract reference also emerges.

2. Theoretical background

In KM, there are two contrasting perspectives on knowledge: the objectivistic and the practice-based views (Hislop et al., 2018). This strictly relates to the popular distinction between tacit and explicit knowledge (Nonaka and Takeuchi, 1995). These perspectives influenced the studies of KM strategies and gave origin to the distinction between codification and personalization (Hansen et al., 1999; Greiner et al., 2007; Ajith Kumar and Ganesh, 2011). Codification focuses on capturing, codifying, storing disseminating and reusing explicit knowledge in a form that is compatible with a company's organizational objectives; personalization (or human-

oriented KM strategy) has the goal to improve tacit knowledge flows through networking and interactions essentially between people.

The two approaches can be seen to be alternative or more precisely, as Hansen et al. (1999) suggest, a company may follow a strategy that mixes them, but one is predominant and the other just supportive (specifically, they indicate a "desirable" 80-20 split). The choice of the prevailing KM strategy must be driven by a company's competitive strategy, and particularly: the kind of product (standardised or customised), the level of innovativeness (mature or innovative products), and the prevailing kind of knowledge used by employees to solve problems (explicit or tacit).

McMahon et al. (2004) agree that the KM strategy should be aligned to organisational conditions (and, particularly: the originality in the design process, and the design complexity) and that can be influenced by other circumstances (for example, specific technological barriers). However, they claim that the two approaches are not mutually exclusive, because both personalisation and codification can be equally necessary. Scheeper et al. (2004) add that the "80/20 KM strategic mix" may not remain constant over time: organisations may find it useful (or necessary) to revise their KM strategy time by time. In this regard, they propose a model of a progressive strategic pathway towards the effective organisational use of knowledge, pathway which depends on factors as: the nature of the business, the political and cultural contexts, the organisation size and geography. They also underline the need of longitudinal studies that closely track the evolution of KM strategies over time.

Greiner et al. (2007) analyse the relationship between the success of KM and the alignment between business strategies and KM strategies. Their study suggests that organisations focusing on an innovation strategy face high equivocality and may need a personalization strategy, while organisations with a focus on efficiency may face less equivocality and, consequently, a codification strategy is appropriate. They also underline that codification and personalisation are not two extremes but rather dimensions that can be combined, since relying on one approach only may be risky. Specifically, an excessive emphasis on codification and reuse of knowledge may not allow to face market dynamics, while promoting interpersonal interactions does not necessarily lead to innovation.

Similarly, Ng et al. (2012) are in favour of a hybrid strategy: if organisations rely too much on human factors, the new ideas may evaporate due to lack of actions and supporting mechanism, while if organisations emphasise formalized KM systems too much, creativity might be restrained. Ajith Kumar and Ganesh (2011) analyse some Indian companies and confirm that there may be a reinforcing relationship between the two KM strategies. Finding a balance of these is deemed important because it may allow a company to achieve the benefits of reusing explicit knowledge and generating or disseminating employees' tacit knowledge. In their view, longitudinal studies are needed for a better understanding of how (and why) this balance can change over time.

Powell and Ambrosini (2012) investigated some consulting companies that adopted a "pluralistic approach" to KM using multiple KM tools. Table 1 proposes a comparison of the features of personalization and codification strategies discovered by the two authors in the real-life cases examined.

Table 1: Comparison of KM approaches (adapted from Powell and Ambrosini, 2012)

	Personalisation	**Codification**
Reach	Whole organisation	Whole organisation
Search Process	Contact an expert	Search, review and use documents from KM systems
Transfer	Via person	Via document
Memory	Present employees	Past and present employees
Requirements	Expert directory	Creation and management of KMS
Knowledge focus	Undocumented & Documented	Documented
Performance impact	Innovation & Quality	Time saving

According to this study, companies modify their focus not only because of a change in contextual factors (such as firm size or geographic scope), but also because of the experience they gained from implementing a specific KM strategy. In conclusion, the authors maintain that a bespoke approach to KM can produce superior results since it allows to consider a firm's specific needs.

A significant contribution comes from three papers by Venkitachalam and Willmott (2015; 2016; 2017) that are based on the analysis of the KM strategies of four organizations of different size and sectors. The authors claim that placing closer attention to the contextual embeddedness of a KM strategy can be more fruitful than simply considering universal prescriptions. In Venkitachalam and Willmott (2015) the influence of some factors (competition, leadership, politics, culture and technology) on the KM strategy is investigated: the authors find that these different factors have differently shaped the KM strategy of the four organizations. In Venkitachalam and Willmott (2016) the authors consider other factors such as: operation level (local, national, international, multinational), firm size, competition, organisational structure, IT infrastructure, business innovativeness and kind of product/service. Particularly, the authors emphasise the importance of the geographical operation environment in shaping the KM strategy. These two papers show that organizations can have a different mix of personalization and codification strategies, depending on the interaction of diverse internal and external environmental factors. Also, the strategic mix changes in relation to variations in the contextual conditions. In their last paper, Venkitachalam and Willmott (2017) highlight the possible risks of an excessive personalization or codification: too much personalization may lead to "knowledge proliferation" while too much codification to "knowledge structuration" that can impede idea generation and radical innovations.

To sum up, the literature shows that: a) rather than a single specific KM strategy (personalization rather than codification), companies may have a combination of the two coexisting strategies; b) this combination depends on different contextual situations of a company; and c) the KM strategic combination can change over time as the context changes. Table 2 summarises the various factors that have been analysed by the different authors and suggested as elements for explaining the adoption of a specific combination of KM strategies.

Despite the interesting results achieved by the mentioned studies, there is still much to learn about how companies change their KM strategy over time, and what factors can play a role in explaining these changes. This is the goal of our study.

Table 2: Factors affecting the KM strategy approaches identified by the literature

Factor	Authors
Business strategy	Hansen et al. (1999); Greiner et al. (2007); Ajith Kumar and Ganesh (2011)
Competition	Venkitachalam and Willmott (2015; 2016)
Organisational structure	Venkitachalam and Willmott (2016)
Leadership	Venkitachalam and Willmott (2015)
Organisational politics	Scheepers et al. (2004); Venkitachalam and Willmott (2015)
Cultural context	Scheepers et al. (2004); Kumar and Ganesh (2011); Venkitachalam and Willmott (2015)
Product characteristics	Hansen et al. (1999); McMahon et al. (2004); Venkitachalam and Willmott (2016)
Business nature	Scheepers et al. (2004); Venkitachalam and Willmott (2016)
Size	Scheepers et al. (2004); Ajith Kumar and Ganesh (2011); Venkitachalam and Willmott (2016); Powell and Ambrosini (2012)
Geography	Scheepers et al. (2004); Powell and Ambrosini (2012); Venkitachalam and Willmott (2016)
Technology (IT)	McMahon et al. (2004); Ng et al. (2012); Venkitachalam and Willmott (2015; 2016)
Past experience	Powell and Ambrosini (2012)
Tacit vs. explicit	Hansen et al. (1999)

3. Research goals and method

Based on the previous analysis of the literature, we formulated the following two research questions:

RQ1: is it confirmed that the mix of codification and personalisation KM strategies can change over the years in the same company?
RQ2: can these possible changes be explained in relation to specific organizational or contextual factors?

With this aim, a longitudinal case study methodology was adopted (Yin, 2018). This methodology is essential for our aim since we intend to investigate changes that have occurred over several years. Longitudinal research considers an extended time period to enable in-depth exploration and analysis of social phenomena, specifically as these develop or change. It is especially used to seek explanations or clarifications by identifying patterns

emerging over time, either within a single case or across cases in a comparative case study design (Mills et al., 2010).

The investigated case concerned the KM initiatives undertaken during the last thirty years by the Advisory Service Line of a Multinational Consulting Company, whose name is disguised for reasons of confidentiality. The Company is a pioneer in the KM field, which facilitated the collection of information about their pluriannual experience. The KM history was reconstructed through available internal documents and past studies, and thanks to the information provided by a senior KM manager who took an active part in the implementation of KM practices and tools adopted by the organisation. Information was collected during several interactions that the authors had with the KM manager over the last decade. To answer the research questions in a punctual way, the history was reconstructed by highlighting the influencing factors identified by the literature and illustrated in table 2, i.e.: competition, business strategy, product, managerial style, culture, KM perception, and enabling technologies.

4. Case study

4.1 Company description

The company is a multinational professional services provider operating in more than 150 countries. It is a global leader in professional services with more than 280,000 employees. As a well-reputed KM pioneer, the company has been integrating KM formal practices into its culture, processes, and infrastructure for more than twenty-five years. Its once separated, country-based project teams have evolved into a global knowledge organization which focuses on harnessing the power of ideas, insights and experience to deliver successful services and products. The long KM history of the Advisory Service Line will be briefly summarised with the aim of describing how, and due to what factors, its KM strategy has changed over three decades from mid-1990s to present.

4.2 The 90s

In the 90s, the overall market landscape and competition were changing fast, from local country-based services to more globalised products, services and skills. In this fast-evolving market, the emerging need for specialization led to focusing on a more industrialized, vertical (i.e. designed for a specific sector) and efficient service delivery. The managerial approach was very hierarchical, based on central decision-making and the ability to operate mainly at the local level. The leadership style was quite traditional, with younger generations of professionals following the successful models of the past. There also was a strong influence of local cultural factors, which influenced behaviours and hindered transversal collaborations.

At that time, KM was considered a promising approach, able to support business strategies by means of a formalization of knowledge for sharing and reusing best practices. The available (and emerging) technologies of those years were centred on content management and mostly allowed an efficient replication of data and databases across areas and borders. The first Intranet systems started to develop and raised the attention especially of innovative adopters and first movers, seeking for a competitive advantage by means of this technology. Search engine technologies also started to improve gradually, and their efficiency increased as more digital content became available.

In this context, the KM approach of the company highly focused on reusing knowledge already available, firstly by identifying what was produced in the different locations, and then by codifying and storing these contents to make them easily and quickly available to a broader audience. Some "subject-driven" knowledge bases were implemented by collecting best practices in a central location and replicating it to other locations. However, there was an increasing awareness that a generic knowledge base may not be enough to sustain a business strategy of specialization, and that the existing search engines were not able to meet user needs. By the end of the decade, the first global taxonomies i.e. a shared terminology used to tag contents started to be created to both address the need for improved KM processes (searching/locating knowledge) and at the same time avoid fragmentation of intents (initiatives). Always in these years, the first "Community of Interest" networks were established, where individuals physically met to agree on knowledge sharing and collaboration guiding principles and priority contents.

KM programs were organized by means of local KM teams, delivering services locally, mainly regarding content collection, storage, and search on behalf of practitioners, in some cases with customized solutions that did not

necessarily resulted into best practices to be shared with others. They were based on mature technologies (such as Lotus Notes and Domino, market leaders and de facto standards) to implement robust content management processes and enable appropriate Intranet user experience. KM programs were sponsored typically by local consulting leaders, with initial prudent trials at a global level to support some global initiatives and issues. Knowledge managers usually sat at a local level, with limited hubs in strategic locations - near to influential leaders, like in the US and UK.

In conclusion, the overall prevailing KM strategy was substantially codification, aiming at improving and increasing knowledge sharing and reuse of key contents. In this framework, there was a clear emphasis on explicit knowledge sharing, and the most requested skills for KM were those of librarians, humanistic disciplines, and communication-related degrees, essential to create the shared terminology that serves to facilitate the storage and retrieval of content.

4.3 The '00s

This decade was characterized by a serious market crisis and fierce competition. The survivors needed to become more efficient but were not able to avoid giving space to new players, who took advantage of their smaller size and bigger ability to adapt to the fast-changing conditions. Consulting branches of the "Big Four" companies were also sold, to overcome the "no-independence risk" against the audit practices; i.e. the fact that every audit company is not allowed to also sell consulting services to the audited organizations, to avoid any independence conflict. This caused a major loss of intellectual capital that had to be rebuilt from its scratch, once the non-compete agreements had ended. This rebuilding process was achieved by hiring a team of experts whose tacit knowledge was codified into new service delivery methods and, in this way, transferred at a global level to be applied in the field. A common language definition was necessary, which resulted in long-lasting consultations at top management level and broad investments at global level, to improve efficiency and accelerate processes. Service globalization and specialization continued, focusing even more on verticalization, with a process of dissemination of the experience with pilot clients across other sectors and mutual exchange of knowledge among them. Examples are the best practices in Finance coming from the Utilities service sector, or the Supply chain best practice coming from the Manufacturing sectors.

Leadership and managerial style also changed, from a strongly vertical and functional hierarchy into multifunctional process-driven project teams. KM initiatives had a diverse mix of sponsorship, with supporters but also sceptics, which was mainly due, rather than to cultural elements or geographical location, to personal bias and beliefs. KM initiatives lived a phase of general lack of trust, due to the failures of some programs in the previous decade and the poor results of the big investments in technology.

Also, innovative Web 2.0 enabling technologies were progressively replacing the old systems, and improved engagement and participation of final users themselves, who became more "prosumers" than simple "consumers" of the technical systems. The first examples of smart working and virtual teaming were tested in those years.

In this overall scenario, the KM approaches followed by the company focused on reuse and sharing of both explicit and tacit knowledge, to sustain the creation of a global language aimed at accelerating and bringing efficiency to codified knowledge sharing. But this was complemented by some personalized approaches. The company Intranet got implemented with a renewed focus on global taxonomies and progressive consolidation of local practices. This approach remained fragmented, with major headquarters taking the lead and connecting to each other while smaller ones still catching up for lack of strategic vision, investments and resources. KM priorities were directed on global taxonomies and on the creation of knowledge objects, but also on supporting the establishment of the first online communities of practice. These communities have gradually extended their geographical scope from countries into regions into broader areas.

By the end of the decade, a new global KM platform was released, with a strong focus on user experience and a combination of different content types, including methods and policies for "go-to-market" and service delivery, with a multiple view across all organizational domains including the ability to navigate every content type by sector as the sector tag was added to each document. Videoconferencing was also used extensively, to integrate leveraged explicit knowledge with stronger people-to-people tacit knowledge sharing.

Even the promoters of KM initiatives moved away from being only local, to becoming more and more regional and finally global. The global initiatives were typically led by the vertical dimensions of sectors where it was easier to establish a common language, while at the level of the single service delivery, approaches were still localized and fragmented. KM teams were organized at regional level with a central shared service in some locations, providing both a buffer of resources to address capacity peaks and back-end platform maintenance processes like document validation and publication.

So, while a codification approach was still prevalent to sustain the continuous effort towards standardization, in parallel there was an emerging need for personalization, seen as incubator of new approaches and best practices, to be tested in mature contexts and then spread more broadly.

As mentioned before, there was a substantial balance between explicit and tacit KM, with increased awareness that only the combination of the two could result in a positive user experience and a more efficient reuse of existing intellectual capital.

Summing up, while in the previous decade the prevalent focus was on content, in this decade there was a clear move towards communities support and empowerment, while the most requested skills from knowledge managers move into the area of economics to bring more process efficiency and metrics analysis to measure the impact of KM.

4.4 The current decade

The current decade is characterized by stronger and faster market changes, where competition becomes more and more fierce. In this context, business strategy is focused on a growth that cannot be only internal but requires acquisition of emerging and fast changing skills and competencies provided by new players and start-ups. These initiatives imply embedding the knowledge assimilated from the acquired companies into proprietary assets. In addition, the first social platforms and eco-systems are developed, where different players can collaborate and produce innovations in services and their delivery, to accelerate the "go-to-market" of new services and products.

Managerial approaches tend to change consequently: more delegation and agility is allowed, organization becomes flatter, and leaders are recognized "on the field" rather than through organizational charts. Human resources tend to be characterized by the co-existence of different "generations". This claims for a combination of traditional communication and management strategies with more innovative ones, and additional investments and resources are needed. Especially, the younger generations of employees tend to manipulate knowledge more easily with technologies, while the older struggle to keep up with the changes and run the risk of being excluded by career progression if not well equipped on the technological side.

The technology-enabled KM approach and processes live a moment of renaissance, as they are recognized as being the foundational element of any socially enabled enterprise, the backbone of any new initiative.

In this scenario, social platforms and networks emerge, disrupt the old behaviours and facilitate people-to-people interactions, empowering potentially anybody in the organization to raise questions and get an answer in few minutes if not seconds.

The main KM approach of the company shifts to channelling as quickly as know-how and experts, leveraging and combining their knowledge to fit the purpose of a continuing evolving business. The online communities established in the late '90 are now revised and are progressively evolving around the emerging social styles and social platforms. Communities are now user-centric: the same person can belong to different communities at the same time depending on roles, projects and interests. There is a strong pressure at improving the user experience to the point that most of knowledge consumption happens in a self-service mode. Knowledge services focus on cultural aspects to promote a deep behavioural change of practitioners. Accordingly, content and community management get integrated, and KM activities are evaluated based on the resulting cultural changes. It is time for technology harmonization, where more traditional tools get coupled with more innovative social platforms. Knowledge is recognized as a key pillar of market strategy and is all managed at the global level, with a global sponsor and budget, and multi-location and multi-specialization shared services. There is a substantial balance and integration between codification and personalization: codification gets progressively

efficient by means of automation and driven by data analytics, while personalization is used to promote and support the diffusion of a knowledge sharing-oriented culture. It is also the time for better balance and integration of explicit and tacit knowledge sharing, enabled by the above-mentioned technologies. Most required KM skills become computer science, engineering, analytics, with a strong pressure on process digitalization and big data driven enhancements.

Tables 3 and 4 provide a synthetic summary of the dynamic evolution of the KM approaches adopted by the case company, and of the enabling factors.

Table 3: Summary of findings (factors)

Factor	1990s	2000s	2010s
Competition	Globalisation and dynamism Clients and markets tend to rapidly globalise, and become more demanding	Crisis and fierce competition Two major crises require efficiency and leave room for new players	Continuous evolution Markets and competitive environment are increasingly subject to rapid change
Business strategy	Specialization The focus is on a specialized offer able to better satisfy the clients' needs	Business restructuring Consultancy is sold to start again from "zero" with strong investments in methodology and common language	Growth The focus is on an inorganic growth through acquisitions aimed at strengthening the market position
Product	Local but specialized by sector Products remain local but are increasingly specialized by sector (verticalization) to increase efficiency	More and more specialized and global Products globalization accelerates and verticalization continues. Contamination between the various sectors	Global platforms Platform are established, where different players collaborate innovating and bringing together products on the market
Managerial style	Hierarchical Leadership is declined in terms of command and control	Process-based Towards a process-based organization, with multi-functional project teams	Participatory Delegation, with an agile and flat organization
Culture	Homogeneous by geographical area Young people follow the example of the old with behaviours differentiated by geographical area	Heterogeneous Alternative approaches are tested and in case adopted. Different behaviours linked to geographical and cultural elements but also to individuals' personality	Heterogeneous Four generations together with challenges and opportunities. Different understanding and use of the new platforms among the various generations
KM perception	Trendy KM seen as an opportunity to support business strategy	Skepticism KM is experiencing a phase of "mistrust" also due to failures of previous decade	Renaissance The business appropriates the KM methodologies
Enabling technologies	Content repositories Emerging technologies allow the automatic replication of all the best practices. Search engines are rapidly improving	User generated content repositories The evolution from Web 1.0 to Web 2.0 changes consumers into prosumers and activates engagement and participation	Social networks Enterprise Social Media are available. KMS become building blocks and backend of social platforms

Table 4: Summary of findings (KM approaches)

KM	1990s	2000s	2010s
Overall approach	Re-use Identify existing knowledge, codify and store it to make it easily and quickly accessible. First DBs of thematic knowledge are created containing the best practices of a certain area. Specific spaces are devoted to Communities of Interest. The first global	Re-use/sharing Encourage the sharing of content and tacit knowledge. A common language is created that allows a more rapid and effective sharing of codified knowledge. Internal knowledge webs are realized, with the strengthening of global taxonomies. First online	Sharing/creating new knowledge Mobilize know-how and experts in a fast and effective way, while simultaneously adopting and integrating their knowledge. Online global communities are launched, which are a technology-enabled revision of the old

KM	1990s	2000s	2010s
	taxonomies are defined in order to consolidate and use knowledge in a less fragmented way	Communities are established. The approach remains fragmented.	communities. Technological platforms are redesigned to increase the use of self-service knowledge
KM processes	Content management Gathering, storing and searching content	Content management and sharing of tacit knowledge Sharing both through the creation of taxonomies and knowledge objects, and the facilitation of interpersonal interactions	Dynamic knowledge sharing Content curation, community management, enhancement of a knowledge sharing culture
KM technology	Lotus Notes, Domino	Multi-countries Intranet knowledge platform, videoconference	Share Point, Yammer
KM sponsor	Predominantly local	From local, to regional, to multi-regional towards global	Global
KM location mix	Local	Glocal	Global
Codification Vs. personalisation	A codification strategy prevails aimed to facilitate rapid sharing of key knowledge	While a codification strategy continues to prevail, initiatives with personalization goals are increasing	Substantial balance. Artificial Intelligence and analytics allow to automate processes and free KM on activities with higher added value
Explicit Vs. tacit	Prevalently explicit	Substantial balance between tacit and explicit	Substantial balance between tacit and explicit
KM focus	Content	Content + Community	Content + Community + Culture
KM skills mix	Librarians, graduates in Human Sciences: communication and language	Economists	Engineers, computer scientists, data analysts

5. Discussion

What emerged from the investigated case provides a positive answer to both our research questions. The study also confirms the findings of the recent literature: companies tend to adopt a balanced strategic mix, in the form of the most appropriate combination and integration of codification and personalisation; this is contingent on a set of internal and external factors and can vary over time.

Concerning the first research question (i.e. *if it is confirmed that the mix of codification and personalisation knowledge strategies can change over the years for the same company*), the evolution of the KM strategy of the investigated company shows that this is exactly the case. In particular, the company has followed a path moving from an initially codification-oriented approach to a more balanced one. During this path, the company moved from a locally fragmented KM to a globally managed one. It is interesting to note that, sometimes, one or the other approach tends to prevail due to specific initiatives (e.g. the creation of taxonomies or the restructuring of communities). However, over long periods, no strategy clearly predominates, even if the combination changes. Hence a first lesson from the study is that the evolution of a company's KM strategy follows a path denoted by a dynamic balance between codification and personalisation.

As regards the second question (i.e. *which factors can influence the changes in the KM strategic mix*), the investigated case offers interesting insights. More specifically, it seems to suggest that various factors had different importance and played different roles. Those strictly related to the competitive environment, as the nature of competitors and markets, or the implemented business and product strategies, have mainly affected the KM strategic mix, which confirms the results of previous studies (Hansen et al., 1999; Greiner et al., 2007) that the choice of KM strategy is primarily driven by the company's competitive strategy. Other factors (like managerial style and leadership, culture and KM perception) seem to act as special constraints that may influence the way KM strategy is carried out. For instance, in the investigated case, in the '90s a not uniform propensity in the company towards innovative behaviours has determined a territorially fragmented adoption of KM tools and practices. Conversely, in the last decade, a more participative leadership style has favoured the

use of Communities of Practices. To sum up, the study seems to confirm that the different factors interact with each other according to the role they play.

The technology deserves a special mention since it seems to act as both a constraint and an opportunity. While the first KM ICT-based systems of the '90s were well suited for a codification strategy, the new Web 2.0 tools, and specifically the Enterprise Social Media platforms introduced by the company, appear to be more "neutral" and to favour a mixed KM approach, for they can be used to manage both tacit and explicit knowledge. This last point, together with the findings of the recent literature (e.g. Venkitachalam and Willmott, 2017) raises the question whether the distinction between the two approaches is still valid and useful in the practice, or it is just an abstract reference.

6. Conclusion

The study contributes to improve our understanding about the nature of the strategic KM mix and specifically its evolution and affecting factors. As regards the academic contribution, it confirms the findings of previous literature about the dynamics of KM strategic mix and about the factors that affect such dynamics. Furthermore, it allows to identify different classes of factor according to the role that they play. Lastly, it raises the doubt that the distinction between codification and personalisation still has a practical sense. Concerning the managerial contribution, the study re-affirms the importance of a balanced, but not static, KM approach, and offers food for thought to managers regarding the need to continuously align the KM strategy to internal and external environmental changes, and hence to the business strategy adopted to face such changes. In this regard, the study suggests that companies should learn to analyse the changes of their business context by using a knowledge-based reading. Clearly the study is not without limitations. Particularly, only one case (even if paradigmatic since the investigated company is one of the most admired in the KM field) may not be enough to generalise findings. Furthermore, it focused on a limited set of factors. This paves the way for future research aimed at deepening our understanding on the topic.

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The Effect of Intellectual Capital Disclosure on Intellectual Capital Efficiency

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Abstract: This study aims to examine the effect of intellectual capital disclosure (ICD) on intellectual capital efficiency (ICE). The study was examined by a pooled data of 150 observations from listed firms on the Bahrain Stock Exchange during the period from 2011 to 2015. Multiple regression models were incorporated under the Random-effect method. The result of the study indicates that ICD has statistically negative significant effects on the capital employed efficiency (CEE) However, ICD has an insignificant impact on human capital efficiency (HCE) and structural capital efficiency (SCE).

Keywords: human capital efficiency (HCE), structural capital efficiency (SCE), capital employed efficiency (CEE), intellectual capital disclosure (ICD), Intellectual Capital Efficiency (ICE), Kingdom of Bahrain

1. Introduction

During the last two decades, intellectual capital has been considered to be one of the important influential intangible assets in creating more value for the companies that are aspiring to compete in the changing environment (Nawaz et al., 2014; Bhatti and Zaheer, 2014). Rechberg & Syed (2013) stated that changing in the environment has changed many perceptions of companies and therefore knowledge has become the driving force behind knowledge-based economy; in the same context, Wang (2008) stated that knowledge has become a capital asset. This has resulted in increased attention toward intangible assets consisting of knowledge and experience of manpower, database, and systems, business relationship, goodwill and alliance (Saunders, 2016). Intellectual capital is considered as one of the most important intangible assets that need to be valued and measured in different situations and circumstances to help organizations in maximizing the value-added from these important assets; Petty and Guthrie (2000). Intellectual capital has already been defined by (Sharabati et al., 2016) in the published literature as: "It is an organizational intangible asset; knowledge with potential for value or knowledge that can be used to create value; consists of three components: human, structural, and relational capital; and the human capital is the core of intellectual capital".

Various academic researchers (Singh & Kansal, 2011; Giacosa et al., 2017; Anet al., 2011) discussed the need for further investigation in the area of intellectual capital disclosures and intellectual capital efficiency.

This study aims to investigate how intellectual capital disclosure may affect the efficiency of intellectual capital in Bahrain. The selection of Bahrain as a country of the study was due to the importance of Bahraini business context for labor power and intellectual capital where Bahrain is considered in GCC countries as a global financial hub that brings different investments and foreign companies to operate in Bahrain due to its well-developed business rules and regulations. Rosman et al. (2017) asserted that Bahrain is playing a significant role in the Middle-East and GCC countries as a hub for financial investments for the same reason. Therefore, this study investigates the effect of intellectual capital disclosure on intellectual capital efficiency in Bahrain.

2. Literature review and hypothesis development

Petty & Guthrie (2000) have published a study focusing on the relationship between IC efficiency and intellectual capital disclosure, which attracted the attention of intellectual capital as a business and research topic. Petty & Guthrie (2000) study reviewed the most significant extant literature on intellectual capital and important theoretical and empirical contributions related to the measurement and reporting of intellectual capital. The conclusion of this paper identifies possible future research issues that could be taken into account by academic researchers, for instance, the nature, impact, and value of intellectual management and reporting. In Bahrain, there are few studies regarding the concept of intellectual capital, Ismail et al. (2011) examined whether IC influenced the bank's financial performance in Bahrain for the period from 2005 to 2007. The study used two regression models to test if the VAIC is associated with financial performance. Ismail et al. (2011) found that HCE

and CEE are positively associated with financial performance but there was no significant association between SCE and financial performance of the banks in Bahrain. Another study was conducted by Sarea & Alansari (2016) to examine the relationship between the intellectual capital and earnings quality for the listed firms in Bahrain Bourse. Sarea & Alansari (2016) found that firms have a high level of intellectual capital and earnings quality as well as a positive relationship between them in all listed firms at Bahrain Bourse.

Moving to GCC countries, Razak et al. (2016) examined the Saudi Banking sector's annual reporting of Intellectual Capital (IC) in terms of content, and measurement of intellectual capital performance. Content analysis was used to examine ICD practice in the annual report of 12 commercial banks in 2014. It was reported that all the listed Saudi banks disclosed intellectual capital information. In terms of the average percentage for the three categories, human and external capital were closely matched at about 38% and 35% respectively, while internal capital was significantly lower at 27%.

El-Bannany (2012) investigated the IC performance of UAE banks for a duration of 7 years from 2004 to 2010. The results indicated that the financial crisis and market structure have a significant impact on IC performance. Abdulsalamet al. (2011) measured the IC efficiency of banking sectors in Kuwait using a duration of 10 years period from 1996 to 2006 and adopting the VAIC model. The banking sector was divided into commercial and non-commercial banks. The ranking results based on HCE showed similar results as that of VAIC. While the ranking results of CEE are not in line with VAIC.

Overall, literature in Bahrain and surrounding countries indicate that the efficiency of intellectual capital was looked from a different perspective. However, the effect of intellectual capital disclosure on intellectual capital efficiency has not studied in this region. This conclusively addresses the question: is there any effect of intellectual capital disclosure on intellectual capital efficiency?

Depends on the resources-based theory developed by Grant (1991) which considers the intellectual capital as the main strategic asset in creating and maintaining firms' competitive advantage, together with the legitimacy theory which claims that management has to disclose information that might change the users' opinion about their company (Cormier & Gordon, 2001). Therefore, this study proposes that intellectual capital disclosure be positively associated with intellectual capital efficiency and the related components. Therefore, the main hypothesis has been derived from the literature and divided into the three sub-hypotheses:

> *H1: Intellectual Capital Disclosure positively affects the Efficiency of Intellectual Capital of Bahraini listed Firms".*

> *H1.1: Intellectual Capital Disclosure positively affects the Efficiency of Human Capital of Bahraini listed Firms".*

> *H1.2: Intellectual Capital Disclosure positively affects the Efficiency of Structural Capital of Bahraini listed Firms".*

> *H1.3: Intellectual Capital Disclosure positively affects the Efficiency of Capital Employed of Bahraini listed Firms".*

3. Research methodology

3.1 Study population, sample and resources of data

This study is based on the selected sample comprising 150 observations for 30 listed firms in Bahrain stock exchange for duration of 5 years from 2011 to 2015. The data used in this study was collected from the annual reports of listed firms. The pooled data was used in our sample which combines both time series data and cross-sectional data (refer to table 1).

Table 1: Sample selection

Sector		Study population	Excluded		Study Sample	Total observations
Commercial Banks		7	0		7	35
Hotels & Tourism		5	1		4	20

Sector		Study population	Excluded	Study Sample	Total observations
Industrial		3	0	3	15
Insurance		5	2	3	15
Investment		11	3	8	40
Services		10	5	5	25
Total (Time series 5 years)		**41**	**11**	**30**	**150**

3.2 The variables

Dependent variables

The dependent variable (Intellectual Capital Efficiency) has been measured using Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE). The efficiency of IC can be measured using VAIC following previous studies (Hamdan et al., 2017; Buallay, 2017; Sarea & Alansari, 2016). Table 2 provides the steps followed in the study to calculate the value added by intellectual capital (VAIC).

Table 2: Value added intellectual capital

Variable	Formula
Value added (VA)	Operating profit + employee cost + Depreciation + Amortization
Capital employed (CE)	Equity + long term liabilities
Human capital (HC)	Total costs invested on employees
Structural capital (SC)	Value added (VA) – human capital (HC)
Human Capital Efficiency (HCE)	VA / HC
Structural Capital Efficiency (SCE)	SC / VA
Capital Employed Efficiency (CEE)	VA / CE
Value Added Intellectual Capital (VAIC)	HCE+SCE+CEE

Independent variables

The independent variable of this study is intellectual capital disclosure as in table 3.

Control variables

Four control variables are considered for all models of our study. The control variables are: (1) Firm Size (total assets) (2) Firm age, (3) Audit Quality and (4) Sectors as used by (Buallay et al.,2017; Buallay, 2018),.

Table 3: Variables labels, measurement

Labels	Variables		Measurements
		Dependent variables:	
HCE	Human Capital Efficiency		Is the ratio of value added divided by Human capital
SCE	Structural Capital Efficiency		Is the ratio of Structure Capital divided by value added

Labels	Variables		Measurements
CEE	Capital Employed Efficiency		Is the ratio of value added divided by capital employed
Independent variables:			
ICD	Intellectual Capital Disclosure		Binary variable wherein 0 indicates that the company does not disclose information about intellectual capital in their annual report and l otherwise see) (table 5
Control variables:			
FSIZE	Firm Size		The total assets of the company.
FAGE	Firm Age		The number of years since the company was established.
AUDIT	Auditing quality		The company's external auditor one of the big four audit firms (KPMG, E&Y, PWC, Deloitte)
SEC	Industrial dummy		Dummy variable that equals one for industrial companies.

4. Descriptive analysis

As shown in Table 4, the mean for human capital efficiency in Bahrain reached the highest value in 2015, while in 2013 it was the lowest. It is also shown in Table 4 that the mean for structural capital efficiency reached the highest value in 2012 and it was negative in 2011. The mean of capital employed efficiency was found to be highest in 2015 and the lowest in 2012. About the firm characteristics, it was found that the mean increased over the years. However, the firm size slightly varied over the years. The maximum mean value was found in 2013 and the minimum was found in 2014.

Table 4: Descriptive analysis of intellectual capital components and firm characteristics

Variables			Mean during 2011-2015								
			2011		2012		2013		2014		2015
Intellectual Capital Components:											
Human Capital Efficiency	HCE		2.829		3.556		2.373		3.302		5.480
Structural Capital Efficiency	SCE		-0.372		0.842		0.716		0.696		0.461
Capital Employed Efficiency	CEE		0.263		0.118		0.394		0.484		0.543
Control Variables:											
Firm Age	Age		22.433		23.433		24.433		25.433		26.433
Firm Size	Size		1,166		1,162		1,126		1,185		1,489
Audit Quality	AQ		0.800		0.800		0.800		0.800		0.800

5. Empirical results

ICE is split into three components, and put into the regression equation to predict the effect of ICD on HCE, SCE and CEE.

Independent variable

The results indicate that the disclosure of intellectual capital has statistically negative significant effects on the capital employed efficiency as shown in tables 8-10since the p-value is less than 0.05 (0.012). This can lead to the important conclusion that CEE can't explain the performance of listed firms in Bahrain, thereby demonstrating that an increase in IC disclosure cannot create the value of capital efficiency that directly affects the firm`s performance in the country. However, as shown in Tables 8 and 9, the intellectual capital information has an insignificant impact on the HCE and SCE model as the p-value is more than 0.05 (0.422 and 0.926). This result indicates that Bahraini firms are not able to utilize the full potential of intellectual capital disclosure in their annual reports. This could be translated that Bahraini firms are unaware of the importance of ICD in corporate value creation and shareholder relation and legitimacy.

Control variables

As is shown in Tables 5-7, firm size found is to be having a significant influence in the CEE models, as more tangible assets in a firm positively affect the capital efficiency in the firms. In theory, the relationship between firm size and performance is equivocal, but there is a consensus regarding the effect of firm size on performance. Large firms may perform better, as they have more resources and capabilities and higher efficiency. These firms may have higher profitability. This variable is measured as the natural logarithm of the book value of total assets (Alipour, 2012; Heimeriks and Duysters, 2007). For a firm age, it positively affects the HCE models. As firms getting younger it will have better human efficiency However, the firm age negatively affects the CEE model. Finally, audit quality control positively influenced only the HCE model.

Table 5: HCE regression results

Variables:		HCE Model			
		VIF	β	*t*-Statistic	*p*-value
Independent Variable					
Intellectual Capital Disclosure	ICD	1.316	-3.335	-0.804	0.422
Control Variables					
Firm Age	Age	1.077	0.090	2.308***	0.021
Firm Size	Size	1.175	-0.443	-1.414	0.158
Audit quality	Quality	1.235	13.271	7.299***	0.000
Sector	Sec	1.445	0.258	1.740*	0.079
R Square			0.327		
Adjusted R Square			0.304		
F-Statistic			14.072***		
p-value (*F*-Statistic)			0.000		
Hausman Test:					
Chi-Sq. Statistic			3.642		
***p*-value (Chi²)**			0.162		
Durbin-Watson			1.578		

Table 6: SCE regression results

Variables:		SCE Model			
		VIF	β	*t*-Statistic	*p*-value
Independent Variable					
Intellectual Capital Disclosure	ICD	1.316	0.161	0.093	0.926
Control Variables					
Firm Age	Age	1.077	-0.003	-0.175	0.861
Firm Size	Size	1.175	0.316	1.862*	0.063
Audit quality	Quality	1.235	-0.206	-0.274	0.784
Sector	Sec	1.445	0.307	1.845*	0.066
R Square			0.040		
Adjusted R Square			0.005		
F-Statistic			1.129		
p-value (*F*-Statistic)			0.325		
Hausman Test:					
Chi-Sq. Statistic			3.200		
***p*-value (Chi²)**			0.202		
Durbin-Watson			1.967		

Table 7: CEE regression results

Variables:		VIF		β		t-Statistic		p-value
		CEE Model						
Independent Variable	GCI	**3.690**		**-5.458**		**-6.567*****		**0.000**
Intellectual Capital Disclosure	ICD	1.316		-1.441		-2.524***		0.012
Control Variables								
Firm Age	Age	1.077		-0.014		-2.634***		0.009
Firm Size	Size	1.175		0.204		3.689***		0.000
Audit quality	Quality	1.235		-0.163		-0.656		0.512
Sector	Sec	1.445		-0.187		-3.418***		0.001
R Square				0.282				
Adjusted R Square				0.256				
F-Statistic				10.631***				
p-value (*F*-Statistic)				0.000				
Hausman Test:								
Chi-Sq. Statistic				1.554				
***p*-value (Chi²)**				0.439				
Durbin-Watson				1.928				

6. Conclusion and recommendations

This study aimed to investigate the effect of ICD on ICE in the listed Bahrain firms. The data was collected as a pooled data from Bahrain stock exchange database during the period 2011-2015. The regression model results indicated that indicates that ICD has statistically negative significant effects on the capital employed efficiency (CEE) However, ICD has an insignificant impact on human capital efficiency (HCE) and structural capital efficiency (SCE). From the above-mentioned conclusion, contribution and future research could be drawn as follows: From a practical point of view, it is recommended that Central Bank of Bahrain to have a focus more on intellectual capital disclosures to assure that all listed companies in stock exchange are reporting about their economic situation and non-financial data. This could be approached by conducting regular workshops about the importance of IC and voluntary disclosures. From a governance point of view to improve or re-draft the existing laws and regulation with more attention towards the ICD to reflect transparency in Bahraini annual reports which is expected to attract more local and international investors. From an academic point of view, it is suggested that future research should be undertaken in ICD and to measure to which extent it affects the efficiency of intellectual capital in the GCC countries. The study could be investigated by developing a comparison between the GCC countries taking into account other factors such as cultural issues and management practices.

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Role of Social Capital in Creating Innovative Climate in Enterprises: The Case of Poland

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Abstract: The considerations on the issue of creating innovation in organizations increasingly take into account the notions concerning the significance of intangible value in terms of innovation stimulation. One of these relates to social capital which, by strengthening the cooperation of individuals and groups within an organization, is favourable for the creation of innovative climate. The adoption of the assumption that social capital has an impact on the creation of innovation in enterprises allowed the formulation of the objective of the research which was to receive the answers to the following three research questions: What is the scope of occurrence of social capital in the largest enterprises in Poland? Do differences exist in terms of the degree of occurrence of social capital resources in relation to the type of business activities of enterprises? To what extent do the resources of social capital have an impact on the creation of innovative climate in enterprises? The assumed goal was achieved due to the application of the survey method. The empirical research was conducted among 179 of the largest enterprises in Poland. As a result of the research, significant statistical relationships were found between the resources of social capital and the level of innovation. The positive impact of the resources on innovative climate in the analysed enterprises was indicated. The research results provide the knowledge of the role of social capital in terms of stimulating the innovative behaviour of employees.

Keywords: social capital, resources of social capital, innovation, innovative climate, enterprise

1. Introduction

The development of enterprises and their competitive position on the market increasingly depends on their innovation activities. When analysing the conditions for the development of innovation activities, most researchers indicate economic factors affecting innovation activities of enterprises, namely, expenditure on R&D, size of the company, form of ownership, level of competition, etc. The issues of the determinants of intangible innovation are discussed relatively more rarely. One of these is social capital laying the foundation for cooperation and collaboration among employees which is essential to undertake innovation activities. Social capital supports the creation of innovation in an organization if there is a specific organizational culture based on innovative climate in it. Innovative climate is favorable for openness, freedom of action, generation of new ideas, tolerance of risk or openness to change which is necessary for the development of innovative behaviour among employees. The objective of this paper is to receive the answers to the following three research questions: What is the scope of occurrence of social capital in the largest enterprises in Poland? Do differences exist in terms of the degree of occurrence of the resources of social capital in relation to the type of business activities of enterprises? To what extent do the resources of social capital have an impact on the creation of innovative climate in enterprises? The assumed objective was achieved due to the application of the survey method.

2. Theoretical background

Innovation in enterprises has become the subject of numerous scientific research projects in which researchers inquire both the conditions and reasons for the level of innovativeness of enterprises as well as the determinants of its development. In scientific literature, there are various definitions of innovation that significantly differ from each other. Dziallas and Blind (2019) define innovation as "invention plus utilization", i.e. it includes the implementation of a new or significantly enhanced product, process or service as well as commercialization of innovation. Hence, the term innovation refers to innovative ideas which are to be commercialized on the market as well as the ideas which have been successfully commercialized. In turn, Kahn (2018) presented three ways of its exemplification: as a result, as a process, as a way of thinking.

Innovation is also influenced by external factors, i.e. economic, political and socio-cultural and internal, the so-called organizational ones. The determinants of organizational innovation include the culture of an organization that supports creativity and innovativeness (Naranjo-Valencia et al, 2010). The research by Lau and Ngo (2004) reveals strong ties between some types of organizational culture and the level of innovation. Researchers suggest that development culture is favourable for product innovation. Sometimes organizational culture

creates a specific atmosphere, the so-called organizational climate. This is the way in which employees experience organizational culture which is displayed in their attitudes and behaviour. Organizational climate is both formal and informal common compliance with organizational principles, practices and procedures (Holloway 2012). In the enterprise oriented to the creation of innovation, it is possible to build innovative climate which, among others, includes beliefs, values and norms, styles of management, relationships between employees and managers as well as motivation system. The significant features of this type of climate are openness to innovation, freedom of action, support for creative ideas as well as sharing knowledge and trust. On the basis of 77 innovative enterprises, Krot and Lewicka (2016) defined the components of innovative climate, i.e. managerial support, creativity of employees, conditions for innovation, approach to risk and infrastructure for innovation.

Social capital may significantly support the functioning of innovative climate in the enterprise. The concepts of social capital are diversified at the level of both conceptualization and operationalization. When analysing its definitions, four categories of its determination can be identified. Firstly, as the theory of networks which indicates that social capital is precisely a social network, i.e. the structure of relationships between two or more participants (Coleman 1988). Secondly, as the theory of criteria, which indicates that social capital refers to integrity, criteria and values embedded in the social network (Fukuyama 1997). Thirdly, as the theory of resources according to which social capital is a collection of actual and potential resources which are associated with possessing a long-lasting network, more or less institutionalized ties, based on mutual acquaintance and recognition (Bourdieu 1986). Fourthly, as the theory of properties of community, which includes networks, norms and trust, enabling coordination and cooperation for mutual benefit (Putman 1994). Summing up, social capital amounts to the component of the skill of cooperation and collaboration of individuals within the framework of social groups, organizations and social institutions of various types in order to achieve common goals.

When analysing social capital in the organization, it is possible to distinguish both internal and external approach (Leana, Frits, 2006). In the external approach, the emphasis is placed on ties of the organization with its external stakeholders. In the internal approach, social capital is perceived as a form and nature of social relations uniting employees of the specific company which affect the creation of organizational climate. Social capital in the organization may be perceived as a resource, i.e. the set of existing or potential resources of a productive nature that lie in the structure of the organization or as a process including operations, interaction between entities of an intangible nature (Skawińska 2012). When implementing the research project, the authors adopted the resource-based view to social capital.

Social capital brings multiple benefits to the organization. It may positively affect an increase in the position of the company on the market due to the transfer of knowledge acquired by means of participation in external networks and spreading knowledge between internal entities of the enterprise (Liu, Ghauri, Sinkovics 2010). Social capital is favourable for sharing knowledge by providing access to explicit and tacit knowledge, exchanging knowledge and innovation in the team (Hu, Randel 2014). At the organizational level, social capital increases organizational innovativeness enabling the flow of information (Nahapiet, Ghoshal 1998). Due to the benefits resulting from the connection of social capital with knowledge and innovation, it is worth developing in enterprises.

3. Methods

The intention of the authors was to analyse the degree of occurrence of the resources of social capital in the largest enterprises in Poland, to define the differences in the degree of occurrence of social capital with regard to the type of business activities of enterprises and the extent to which the resources of social capital have an impact on innovative climate. For this purpose, the empirical research was conducted in the largest enterprises in Poland. The research was carried out in May 2019 among 179 enterprises from the list of the 500 largest enterprises in Poland. The respondents were representatives of these enterprises, i.e. HR directors, HR department managers, HR specialists. To select enterprises for the analysis, random selection was applied. To collect data, the survey method with the questionnaire technique was applied. The research tool was a standardized questionnaire using the CATI and CAWI techniques.

4. Findings

The level of social capital in enterprises largely depends on the degree of occurrence of its resources among employees. On the basis of the classification by Theiss (2005), the following dimensions of social capital were isolated – structural, regulative, cognitive and behavioural within which their resources were identified, including cooperation, solidarity, participation, loyalty and values. The research results for the resources of social capital in the largest enterprises in Poland are presented in Table 1.

An important resource is participation, which belongs to the structural dimension of social capital. On the one hand, it includes the belonging of employees to informal groups, mutual informal contacts in the workplace as well as taking part in integration events and, on the other hand, the membership of trade unions. The attributes of this resource were the most highly rated in service companies and received the lowest rating in manufacturing enterprises. Simultaneously, the differences between enterprises by the type of business activities are not important.

Another resource is cooperation, which is a behavioural component of social capital. Cooperation was the most highly rated by representatives of service companies, particularly sharing information, knowledge and learning from each other and applying knowledge from one area to solve problems occurring in another part of the company. The resource of cooperation received a relatively lower rating among representatives of other enterprises, however, there are slight differences between them. In manufacturing companies, the application of knowledge from one area to solve problems occurring in another area of the company was the most highly rated whereas, in trading companies, it was the possession of the skill of cooperation by most employees.

The component of the cognitive dimension of social capital is loyalty. It is manifested through being loyal to the company and co-workers, readiness to provide help to other colleagues at work as well as keeping one's word. In the analysed enterprises, the value of this resource was rated lower than the aforementioned resources. Simultaneously, there are significant differences between enterprises in relation to the business activities conducted. There were the greatest differences in the case of the indicator of loyalty to other employees. This indicator was the most highly rated by representatives of manufacturing companies and it received the lowest rating among representatives of trading companies.

The resource included in the regulative dimension of social capital is values. Among the analysed companies, representatives of service companies rated this resource the most highly, indicating that most employees accept distinctiveness of co-workers and show respect for norms and values. Another resource included in the dimension of social capital is solidarity based on informal social norms. In the analysed enterprises, it was rated the lowest compared to other resources. Solidarity with other employees was rated the most highly and readiness to take risks in operations received the lowest rating. The degree of occurrence of solidarity is different depending on the type of activities. Solidarity most largely occurs among employees of service companies.

Table 1: Evaluation of resources of social capital in the analysed enterprises

Specification	Total	Manufacturing	Service	Trading
Cooperation resource	3.19	3.17	3.26	3.2
Employees share information, knowledge and learn from each other	3.22	3.18	3.05	3.12
Employees apply knowledge from one area to solve problems occurring in another area of the company	3.27	3.37	3.08	3.27
Employees frequently contact managers when searching for new solutions for tasks commissioned to perform	3.06	3.03	3.23	2.87
The majority of employees have the skill of cooperation	3.13	3.10	3.46	3.38
Employees are creative in solving problems at work	3.25	3.16	3.47	3.36
Solidarity resource	3.05	3.03	3.12	3.01
Employees demonstrate solidarity with colleagues	3.23	3.23	3.40	2.97
Employees put the common welfare ahead of their own	3.17	3.17	3.28	3.00
Employees are ready to take risk in operations	2.79	2.81	2.75	2.83
Employees are characterized by ethics in their relations with other employees	3.02	2.92	3.06	3.26
Participation resource	3.22	3.20	3.33	3.32

Specification	Total	Manufacturing	Service	Trading
Employees participate in integration events willingly	3.29	3.31	3.38	3.43
Employees create informal groups based on cooperation	3.36	3.28	3.48	3.53
The majority of employees are members of trade unions	3.02	3.02	3.14	3.00
Loyalty resource	3.10	3.11	3.13	3.10
Employees are loyal to each other	2.91	3.19	2.61	2.46
Employees are loyal to the company they work for	3.09	3.01	3.25	3.53
Employees are ready to help other employees	2.98	2.88	3.12	3.07
Employees are kind and cordial for each other	3.45	3.38	3.53	3.46
Value resource	3.14	3.14	3.29	3.18
The majority of employees have respect for norms and values	3.06	3.21	3.29	3.27
The majority of employees accept distinctiveness of co-workers	3.26	3.12	3.34	2.93
Employees observe property rights	3.09	3.09	3.23	3.34
Total social capital	3.14	3.13	3.23	3.16

Source: Self-analysis

Scale: 1- I definitely disagree, 2 – I disagree, 3 – I neither disagree nor agree, 4 – I agree, 5 – I definitely agree.

In the contemporary economy, one of significant factors to achieve competitive advantage on the market is innovation (Chen et al 2018). The creation of innovation requires deliberate actions based on cooperation. One of them is to develop social capital. The authors of the paper decided to analyse the impact of the resources of social capital on innovation activities of enterprises in Poland. In the first step, innovation activities were assessed (Tab.2). The representatives of the analysed enterprises evaluated the actions taken at the mid-level. Of all the innovation activities undertaken by enterprises, the cooperation with research and development entities and universities received the highest rating whereas actions undertaken in the area of implementing innovation projects were rated the lowest. The type of actions taken by enterprises had an impact on innovation activities to a limited extent. Only in the case of manufacturing companies was the statistical relationship recorded in relation to cooperation with innovation centres (transfer centres, technological parks) (Ch^2 =8.546, FI=0.218, p=0.014). In the case of the other innovation activities, no significant statistical relationships were indicated in relation to the type of business activities of enterprises.

Table 2: Evaluation of innovation activities in enterprises

Specification	Mean	Median	Standard deviation
Cooperation in research projects with universities contributed to the company development	2.88	3	1.320
Cooperation with research and development units and universities	3.02	3	1.335
Cooperation with innovation centres (transfer centres, technological parks)	2.98	3	1.293
Mechanisms for financing programs and projects devoted to innovativeness	2.90	3	1.266
Actions taken in the area of implementation of innovative projects	2.86	3	1.365

Source: Self-analysis

Scale: scale: 1- completely poor, 2- rather poor, 3- neither poor nor good, 4 – rather good, 5- absolutely good.

In the second step, the authors analysed the extent of the impact of the resources of social capital on innovation activities in the analysed enterprises. Spearman rank correlation was used to investigate their impact. The size of Spearman rank correlation coefficient r_s illustrates the strength of the impact of social capital resources on innovation activities. The conducted research reveals that the resource of loyalty has a positive impact on cooperation in research projects with universities (r_s= 0.220, p=0.003), cooperation with research and development entities and universities (r_s= 0.158, p=0.035) and actions taken in terms of implementing innovation projects (r_s= 0.196, p=0.009. In turn, the resource of cooperation has a positive impact on cooperation in research projects with universities (r_s= 0.233, p=0.002) whereas the resource of value - on cooperation in research projects with universities (r_s= 0.176, p=0.018). Summing up, the impact on innovation

activities is evident only in certain resources of social capital, including the resources of loyalty, cooperation and values.

One of the fundamental conditions favourable for conducting innovation activities in enterprises is innovative climate. To define its level, the scale consisting of 27 statements was applied, built on the scale by Krot and Lewicka (2016). The analysis of Table 3 indicates that the generalized level of innovative climate in the analysed enterprises is at an average level (mean of 4.14). A more detailed analysis indicates that innovative climate is confirmed by the conviction that innovation has a much better chance to succeed if employees can express untypical and unique solutions in their daily work, innovation is the key value in the company and there are coherent objectives of developing innovative projects which are known to employees. Innovative climate is affected by appropriate conditions created by enterprises to undertake innovation activities. The most important ones include the creation of optimal conditions for cooperation between departments and the creation of free access to information and knowledge.

Undertaking initiatives associated with innovation depends on creative attitudes among employees. The impact on their formation is exerted by: the conviction that employees involved in innovative ventures know their personal contribution, the skill of transforming ideas into profitable ventures, the conviction that innovative processes are burdened with high risk and thus errors may emerge as well as mutual help among employees when solving problems within one or several departments.

Another important component of innovative climate is managerial support which occurs in the form of managers' support in breaking through the barriers in the process of implementing innovation, managers' support for employees who want to search for innovative solutions, encouraging managers to take risk and grasping opportunities to develop the company by the management of the enterprise.

Furthermore, innovative climate is affected by expectations set to employees in terms of improving their skills, extending knowledge, which may serve supporting innovative ventures and expecting creativity, thinking and acting in an innovative and original way.

Table 3: Evaluation of innovative climate in enterprises

Specification	Mean	Standard deviation
Information, such as mission, goals and principles concerning innovation is easily available for each employee	4.45	1.968
There are coherent objectives of developing innovative ventures which are known to employees	4.27	2.057
Innovation is the key value in the firm	4.32	1.844
The skill of transforming ideas into profitable ventures	4.23	1.904
The conviction that innovative processes are burdened with high risk and therefore errors may occur	4.35	2.042
The rapid use of suggestions of clients or competitors enabling the enhancement of products	4.04	1.824
The project manager has great autonomy enabling the acceleration, slowdown or complete abandonment of innovative ventures	4.03	1.913
Creating free access to information and knowledge	4.13	2.033
Creating optimal conditions for cooperation between departments	4.22	2.056
Each employee involved in innovative ventures knows their personal contribution	4.37	1.847
Encouraging to take up challenges if they bring benefits	4.16	1.816
Expectations towards employees to improve their skills, extend their knowledge, which may serve the support for innovative ventures	4.26	1.943
Innovation has a much better chance to succeed if employees may express untypical and unique solutions in their daily work	4.60	1.906
Using creativity of employees to achieve profit, which means it is used well	4.09	2.032
Success in the area of innovativeness sometimes arouses envy among other employees	4.22	1.975
Accepting employees' ideas	3.74	1.954
Incurring risk is acceptable	4.05	1.930
Mutual support among employees when solving problems within one or several departments	4.18	1.881
Expecting creativity, thinking and acting in an innovative and original manner from employees	4.14	1.993

Specification	Mean	Standard deviation
Along with the creation of a new solution, there is an increase in the level of recognition in the company	4.08	1.864
Expecting flexibility and rapid adaptation to changes from employees	3.98	1.947
Employees are too busy solving everyday problems to devote time to think about the future	4.21	1.909
Expecting initiatives from employees on the side of managers	4.16	1.854
Managers' support in breaking through the barriers in the process of implementing innovation	4.23	1.883
Managers openly communicate expectations about innovativeness to employees	4.01	1.951
Managers' support for employees who want to search for innovative solutions	4.12	1.828
Encouraging managers to take risk and grasp opportunities to develop the company by the management of the enterprise	4.07	1.863
Generalized level of innovative climate	4.14	1.975

Source: Self-analysis

Scale: 1-I completely disagree, 2- I mostly disagree, I partially disagree, 4- I neither disagree nor agree, 5- I partially agree, 6- I mostly agree, 7- I completely agree).

The type of activity undertaken by enterprises had an impact on innovative climate to a limited extent. Only in the case of manufacturing companies was there a statistical relationship with the existence of coherent objectives of developing innovative ventures, known to employees (Ch2 = 7.038, FI=0.198, p=0.039), the conviction that innovation is the key value in the company (Ch2 = 6.111 FI=0.185, p=0.047) and the statement that success in the area of innovativeness sometimes arouses envy among other employees (Ch2 = 8.178 FI=0.214, p=0.017).

One of the aims of the paper was to define the impact of the resources of social capital on innovative climate. The research analysis reveals that the force of the impact of individual resources on the indicators of innovative climate was diversified. The resource of solidarity had an impact on the largest number of indicators of innovative climate (10 indications), however, the most powerful impact occurred in the case of the following statements: incurring risk is acceptable (rs= 0.300, p=0.000), expecting creativity, thinking and acting in an innovative and original way from employees (rs= 0.253, p=0.001), the skills of transforming ideas into profitable ventures (rs= 0.217, p=0,003). The resource of cooperation had an impact on 9 indicators, with the strongest impact in the case of the statements: there are coherent objectives of developing innovative ventures (rs= 0.322, p=0.000), incurring risk is acceptable (rs= 0.284, p=0.000), managers openly communicate expectations relating to innovativeness to employees (rs= 0.270, p=0.000).

Also, the resource of participation had an impact on 9 indicators, however, the strongest impact was recorded in the case of the following statements: incurring risk is acceptable (rs= 0.283, p=0.000), expecting flexibility and rapid adaptation to changes from employees (rs= 0.273, p=0.000), coherent objectives of developing innovative ventures, known to employees (rs= 0.241, p=0.001).

The resource of value also had an impact on 9 indicators, including: the existence of coherent objectives of developing innovative ventures, known to employees (rs= 0.277, p=0.000), encouraging managers to take risk and grasp opportunities to develop the company on the side of the management of the company (rs= 0.237, p=0.01), managers' support in terms of breaking through the barriers in the process of implementing innovation (rs= 0.227, p=0.01).

The resources of loyalty had a positive impact on 8 indicators, among others, creating optimal conditions for cooperation between departments (rs= 0.245, p=0.01), incurring risk is acceptable (rs= 0.233, p=0.02) and rapid use of suggestions of clients or competitors enabling the enhancement of products (rs= 0.189, p=0.11).

Summing up, the resources of social capital affected all the indicators of innovative climate, however, the strength of this impact was diversified. They had the greatest impact on the acceptance of incurring risk, creating optimal conditions for cooperation between departments and the existence of coherent objectives of developing innovative undertakings, known to employees.

5. Conclusions and discussion

The results of the conducted research allowed for receiving the answers to the formulated research questions. The research results relating to the degree of occurrence of the resources of social capital in the analysed enterprises indicate the average level of their occurrence. The following attributes of social capital occur to the greatest extent: applying knowledge from one area to solve problems in another area of the company by employees, creating informal groups based on cooperation, kindness and cordiality among employees in relation to each other. They create favourable conditions for undertaking innovation activities by employees. Simultaneously, the resources of social capital were the most highly rated in service companies in which the skill of cooperation, based on solidarity and loyalty, is required.

One of the fundamental factors influencing the level of innovativeness in the company is organizational culture based on innovative climate. The generalized indicator of innovative climate is at an average level in the analysed enterprises. A significant impact on its level is exerted by social capital. When analysing the impact of the resources of social capital on innovative climate of enterprises, it was indicated that the resource of solidarity is its most important resource. It has the most powerful impact on the acceptance of incurring risk associated with innovation, creativity, thinking and acting in an innovative and original manner and the skill of transforming ideas into profitable ventures for enterprises. On the basis of the research results, it can be concluded that the resources of social capital first and foremost exert an impact on the acceptance of incurring risk, creating optimal conditions for cooperation between departments, the existence of coherent objectives of developing innovative ventures, known to employees and encouraging lower level managers to take risk and grasp opportunities to develop the company by the management of the enterprise.

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Trust and Intellectual Capital Reporting in Italy: A Longitudinal Perspective

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Abstract: In the last two decades, Intellectual Capital (IC) reporting has experienced a "rise and fall" process. More in depth, after the initial academic and professional enthusiasm, several scholars and practitioners have raised questions about whether IC was something relevant or just a managerial fashion. Some recent studies have investigated the reasons underlying the demise of the IC reports (Chiucchi and Giuliani, 2017; Chiucchi, et al., 2016, 2018; Giuliani and Chiucchi, 2019; Nielsen, et al., 2017; Tee Jeok Inn, et al., 2015). Some argue that a relevant issue to understand if a business reporting practice will be adopted and maintained or rejected is trust (Chaidali and Jones, 2017). In fact, as the implementation of a new business reporting practice is subject to managerial discretion, it is important to focus on preparers' trust in the "new" reporting tool. The purpose of this paper is to analyse the IC reporting experience to understand the role of trust in determining the parabola experienced by IC reporting. In other words, the study aims to understand whether and how the IC reporting issues managed to gain and, in several cases, lose the trust of the preparers'. In order to achieve this aim, the results of an exploratory field study conducted through semi-structured interviews referred to Italian companies will be presented. The social theory of trust (Sztompka, 1999) will be used to understand how the trust on IC reporting was built by the Italian IC scholars and practitioners involved in the field and why it remained or faded over time. This paper contributes to the existing literature answering the call for more follow up studies about IC reporting. Consequently, this paper contributes to the understanding of the reasons underlying the rise and fall of IC reporting and the future of IC research. In addition, the results achieved can contribute to understanding to what extent trust can influence the "fate" of a business reporting initiative. In comparison to the extant studies, this study is not focused on single or few cases but it offers insights collected from several organisations in order to have a broader view of the IC experience. In addition, by adopting a longitudinal perspective, from the first implementation up to date, our research does not offer a "snapshot", i.e. referred to a specific moment, of the role played in taking up and in continuing or abandoning these practices. Finally, the Italian case, which presents some peculiarities if compared, for example, to the Danish one, offers also the possibility to identify different levers/obstacles related to the different genesis of the adoptions of IC reports.

Keywords: intellectual capital, intangibles, business reporting, trust; Italy, intellectual capital reporting, Denmark

1. Introduction and theoretical background

In the last two decades, Intellectual Capital reporting (ICR) has been promoted with the idea that it can bring internal (managerial) and external (disclosure) benefits (Guthrie, et al., 2012; Petty and Guthrie, 2000). These ideas have led to the design of a plethora of Intellectual Capital (IC) measurement and reporting methods and tools that, up to date, are rarely applied in practice (Guthrie, et al., 2012). Indeed, the fact that recently some IC pioneer companies, like Skandia, have abandoned IC reporting have contributed to raising questions about whether IC was something relevant or just a managerial fashion. Moving from these considerations, some recent studies have investigated the reasons underlying the demise of the IC reports (Chiucchi and Giuliani, 2017; Chiucchi, et al., 2016, 2018; Giuliani and Chiucchi, 2019; Nielsen, et al., 2017; Tee Jeok Inn, et al., 2015).

The Danish experience has been recently analyzed by Nielsen, Roslender and Shaper and published in several papers (Nielsen, et al., 2016, 2017; Schaper, 2016; Schaper, et al., 2017). Findings show that most of the companies that participated in the Danish project abandoned ICS a few years after the end of the project or even after the first report (Schaper, 2016)(Schaper, 2016)(Schaper, 2016). The researchers identify two types of reasons that drove companies to abandon ICS: (1) endogenous or active conditions, that is, deliberately taken decisions mainly from companies' top management; and (2) exogenous or passive conditions, such as organisational changes and/or situations of financial distress.

With reference to the Japanese experience, Tee Jeok Inn, et al. (2015) observed a similar albeit less dramatic tendency in Japan, where there has been a decline in the number of IC Statements over the years. In particular, the results show the lights and shadow of the ICR project. Among the benefits, the firms indicate that reporting IC can support the understanding of the organization, of its strengths and weaknesses. In addition, ICR can be a way of building trust among stakeholders, as they appear to be more transparent and with a deeper

understanding of themselves. On the other hand, IC reporting is considered to be weakly linked with the firm profitability, not appreciated by banks, as they tend to rely on financial performance and assets, based on too arbitrary and subjective numbers and time-consuming.

Similar situations of demise of the IC reporting can be found in Italy. In particular, some scholars (Chiucchi and Giuliani, 2017; Chiucchi, et al., 2016, 2018; Giuliani and Chiucchi, 2019) have identified that the demise of the IC report can be related to technical, organizational or personal issues. These authors also highlight the crucial role played by the project sponsor and the project leader. They also identify cases where IC measurements manage to survive over time even if IC reports are demised.

In all, the Danish, Japanese and Italian experience have suggested levers and barriers that can be useful to understand the main reasons of the success or the failure of an IC reporting initiative.

Some argue that a relevant issue to understand if a business reporting practice will be adopted and maintained or rejected is trust (Chaidali and Jones, 2017). In fact, as the implementation of a new business reporting practice is subject to managerial discretion, it is important to focus on preparers' trust in the "new" reporting tool.

Moving from these considerations, the purpose of this paper is to understand the role of trust in determining the parabola experienced by ICR reporting. In other words, the study aims to understand whether and how the ICR issues managed to gain and, in several cases, lose the trust of the preparers'. In order to achieve this aim, the results of an exploratory field study conducted through semi-structured interviews referred to Italian companies will be presented.

The social theory of trust (Sztompka, 1999) will be used to understand how the trust on ICR was built by the Italian IC scholars and practitioners involved in the field and why it remained or faded over time. This theory takes into consideration the importance of trust in a contemporary society in which there is "[. . .] growing anonymity and impersonality of those on whose actions our existence and well-being depend" (p. 13). Sztompka's theoretical framework established three primary grounds for granting or withdrawing trust: reputation, performance and appearance. Reputation is seen as a record of past actions. Humans' trust or distrust of other persons or social objects, such as institutions and organisations, often relies upon their direct previous experience of them. Reputation "spreads with" personal observations, engagement with the object of trust or credentials provided by the trustee and/or by third parties (accounts from other people, membership in associations etc.). Performance is associated with actual actions and their results/consequences. Performance implies a focus on current deeds and tasks rather than past actions. Given the results-driven nature of performance, individuals may use impression management techniques or even manipulate results to obtain trust. Finally, appearance plays an important role in people's trustworthiness. External features, such as body language, clothing and gestures, are often considered as indicators of power and wealth with an underlying meaning relating to one's personality and social position. Humans may take these "superficial, external signs" (p.79) into account when assessing one's trustworthiness.

In comparison to the extant studies, this study is not focused on single or few cases but it offers insights collected from several organisations in order to have a broader view on the IC experience and compare it with the IR one. In addition, by adopting a longitudinal perspective, from the first implementation up to date, our research does not offer a "snapshot", i.e. referred to a specific moment, but allows to understand the factors that have potentially determined the parabola of ICR in order to understand whether the IR discourse will have the same excursus. Finally, the Italian case, matched with the Danish and the Japanese ones proposed by other scholars, will allow proposing reflections regarding the evolution of the IC discourses in practice.

The paper is structured as follow. It continues with a presentation of the literature review, the theoretical framework, the design of the study, and the description of the field study. Subsequently, the authors attempt to make sense out of the case findings, present the theoretical arguments of the study and lastly, draw some conclusions.

2. Design of the study

The purpose of understanding the role of trust in determining the parabola experienced by ICR reporting provided a rationale for conducting an exploratory study, as this variable has not been considered by the extant studies in the IC field.

This research adopts the field study method (Roslender and Hart, 2003) because through the analysis of several organisations it becomes possible to understand whether an emergent finding is simply idiosyncratic to a single case or consistently replicated in several cases and understand complex phenomena such as the use of IC reports.

Field sites are not selected randomly but purposefully. Since it is not easily possible to know the total population of companies that in Italy has ever produced an IC report we adopted a step by step process. The data collection process was conducted in spring of 2014 and involved the data available at that time point. We focused on companies which prepared at least one IC report for internal or external use. Therefore we included in our research only companies which measure and report IC intended as the system of intangible resources including human, organisational and relational capital (Edvinsson and Malone, 1997; Sveiby, 1997). This means that we excluded companies which measure and report only specific IC resources such as human capital, for instance.

First, a review of national and international publications within the IC field has been carried out. More specifically, research in SCOPUS was conducted combining the following words: intangible(s), intellectual capital, Italy, Italian, in the areas of "Business, management and Accounting" and "social sciences". We chose SCOPUS since it is recognised as a high quality and comprehensive publication database (de Moya-Anegón, et al., 2007; Vieira and Gomes, 2009).

Second, we also looked for Italian books which could report on Italian companies measuring and reporting IC. We used Google libri (Italian version of Google books) and the following Italian key-words: "capitale intellettuale", "intangibles-Italia", "intangibles-caso", "intangibles-casi" and "risorse immateriali". We selected books which contained at least one of these words (or combinations) in the title and/or in the preview.

Third, research on Google/Google Scholar using the following keywords has been performed. We used the following Italian keywords: "Report capitale intellettuale", "Report intangibili", "Bilancio capitale intellettuale" and "Bilancio intangibili". The purpose of this step was to collect data about companies that have not been object of publications but which have declared to have measured/reported IC.

Fourth, in order to integrate the results of the desk research some Italian informed persons (scholars and consultants operating in the IC field) have been interviewed in order to understand if the list produced after the first and second steps was complete and, in case, identify the missing firms. A total of 7 persons have been interviewed.

A total of 34 companies have been identified. When the name of the company was disclosed, it was contacted directly. When it was not disclosed, articles and/or books' authors have been contacted in order to get information about the analysed company and the person to contact. Out of the 34 identified organisations, 16 participated (directly or indirectly) in the survey while it was not possible to analyse 18 companies because they had closed, or because it was not possible to contact them for other reasons, or because they declined the invitation to participate in the research project. Even if it was not possible to analyse all the identified companies, the results of this study can be considered as acceptable as our aim is exploratory.

The data-gathering technique adopted was the semi-structured interview. In this study, the interviewees were CFO, controllers, CEOs, General managers, HR managers and consultants. The interviewees were indicated as responsible for the IC reporting projects (they were the Project Leaders). Sometimes they coincided also with the projects' sponsors. In order to overcome bias, the analysis was carried out through analyst triangulation (Yin, 2003): one of the researchers was charged with the data collection, while the others had to examine the interview material and the notes in order to analyse all the evidence. Post-communications with the respondents have been carried out in order perform data validation. In particular, the respondents were asked to confirm or suggest changes to the collected data.

3. The field study – data analysis

The analysed companies declared that they had embraced IC reporting projects for both internal and external reasons (69%) or exclusively for internal ones (31%). None of them prepared an IC report only for external aims. The reasons for reporting IC were ranging from very general ones to very specific ones. As far as external objectives are concerned, the projects were mainly aimed, among others, at improving the disclosure of the company value and performance (by filling the gaps in and supplementing the Financial Statement). Single cases declared specific aims of the IC project, such as producing information useful in merger and acquisitions, showing that the company was innovative despite its small size, etc. As far as internal aims are concerned, the projects were aimed, among others, at: better understanding company value and performance (filling the gaps in the Financial Statement) (4 cases); understanding Human Capital and its performance as well as stimulating certain behaviors (8 cases); showing the company ability to implement strategy and accomplishing projects (1 case), providing information on key success factors (1 case), legitimising the activities of a person or of a department (2 cases); satisfying top management's desire to undertake stimulating and innovative projects (2 cases), etc.

The analysed companies used different frameworks to report IC. At the beginning of the projects, in twelve cases, the IC reports were autonomous documents, while in the other four cases, they were a specific section of the company Social Reports. When IC reports were separate documents, they were predominantly inspired by famous and widely-used frameworks such as the Intangible Asset Monitor or the Meritum guidelines. In a few cases, companies used specific frameworks proposed by the consulting companies that guided the projects.

Of the companies analysed, thirteen continued to report IC for some years, whereas three stopped after the first experience. 'Meteors' are, therefore, only of marginal relevance in the sample. The average duration of the experience was 6.38 years, with a maximum of sixteen years and a minimum of one year.

Moving to the different dimensions of trust, the first element to consider is reputation. Concerning this dimension, some interviewees admitted that, in the beginning, they did not even know what IC was or what an IC report was: they undertook the project because they trusted the consultants and because they "liked the idea" of IC and ICR. In general, all of the interviewees expressed their esteem and appreciation for the consultants, who often had already worked with these companies and especially, with the project leaders or the project sponsors. Two companies referred to one of the consultants as a "guru". Also, the role and the reputation of the project sponsor played a role as the sponsorship by the Board of Directors and/or of the entrepreneur/founder was identified as a key lever by all interviewees and it appears that all of the projects could benefit from this sponsorship. Usually, the project sponsor was instrumental in launching the project and in promoting its relevance. This was possible thanks to the power, legitimisation and reputation of the project sponsor. In all, according to the Italian experience, from a subjective perspective, the trust in the IC projects derived from the reputation of the external partners and/or of the project sponsor.

Another dimension of trust is performance. According to the collected data, the performance issue is here referred to the following aspects:

- the ICR concept;
- the identified levers and barriers;
- the perceived benefits;
- the opinions of the preparers.

In brief, problems, i.e. limited performance, were mainly related to "the lack of a common IC language, understandable by the whole organisation and by the stakeholders… the name "IC" is unclear and often misunderstood" as mentioned by one of the interviewees, to technical (e.g. time consumption, design and implementation of indicators, difficulties in making sense of the indicators, etc.) and organizational aspects (e.g. request of high commitment, involvement of all the managers, etc.).

In addition, 7 interviewees reported that most of the benefits expected by the sponsors and by the top managers were not achieved. In fact, the interviewees report disappointment with reference to the capacity of the ICR to offer a complete and realistic picture of the company IC and of the efforts done to create and develop it. In addition, they also highlight problems for managers and stakeholders in understanding the ICR due to the lack of benchmarks and to the complexity of some indicators.

Despite this, some benefits have also been mentioned. In particular, all the interviewees argue that thanks to the project, the top management and the middle management gain insights regarding the intangibles of the organisation and their role in the value creation process. In other words, the project supported the visualisation and the understanding of the relevance of IC. Some other interviewees had highlighted that the ICR project had supported the development of discussions and interactions on aspects that before were overlooked and thanks to this, some managerial actions and projects have been carried out.

The last dimension of trust is the appearance that is here referred to the format and length of the ICR. Since in Italy, there has not been any large-scale ICR project and, consequently, companies have decided to implement them spontaneously, in different time-points and under the guide of different consultants or researchers, the frameworks used to report IC were different. At the beginning of the projects, in thirteen cases, ICRs were autonomous documents while in the other three cases, they were part of CSR reports where there was a specific section referred to IC. In one case, after a few years, the ICR ceased to be an autonomous document and was integrated with the company quality report. When ICRs were autonomous documents, they were predominantly inspired by popular and widespread frameworks, mainly the Intangible Asset Monitor (Sveiby, 1997) and the Meritum guidelines (Meritum Project, 2002). While for all companies, the experience of reporting IC started with the production of an ICR, it did not necessarily end in the same form. Among the companies that stopped producing an ICR, four continued measuring the specific dimension of IC using only some parts of the initial ICR that became part of the corporate and/or Departmental control systems.

4. Discussion and conclusions

The purpose of this paper was to analyse the ICR experience to understand the role of trust in determining the parabola experienced by IC reporting. In other words, the study aimed to understand whether and how the ICR issues managed to gain and, in several cases, lose the trust of the preparers'.

Trust has been analysed considering the three dimensions identified by Sztompka (1999), i.e. reputation, performance and appearance.

4.1 Reputation and IC reporting

With reference to former, the reputation of the promoters of the ICR project appears to be relevant. More in-depth, in several cases, the external partner appears to be the "deus ex machina" of the ICR projects. In fact, s/he is the one who pushes the idea of introducing an IC report and is the one who, with authority and prestige, greatly influences the decision to undertake these projects. The external partners have a positive reputation in the target industry, and they can criticise concepts in order to reshape the market for management knowledge and establish their innovations. Fifteen of the sixteen companies undertook these projects under the guidance of external partners, i.e., consultants and/or university researchers. In ten cases, interviewees observed that, in the beginning, they did not even know what IC and an IC report were, and they did not know what to expect from the IC project. However, they trusted the consultants and the idea of IC and of the IC report that was communicated to them. In these particular cases, trust was based on the previous experiences or relationships that the project sponsor/leader had with the external partners. In other cases, the external partners were considered gurus, or there was a "particular feeling", a "cultural connection" between the external partner and the company project sponsor.

In some cases, they were considered the "real sponsors" and/or "the real project leaders". In all the examined cases, the interviewees expressed their esteem and appreciation for the consultants. This outcome strengthens the findings of Johanson, et al. (2001) and adds to them by showing how, in our case, the trust in and the appeal of the consultants played a determining role in engaging the company; sometimes the trust placed in the consultant was even more significant than the confidence placed in the IC report itself.

The reputation of the promoters also characterises the Danish experience that involved the Danish government and several well-known Danish scholars and consultants. This means that our results are, to some extent, consistent with the ones proposed by the scholars that have examined the rise and fall of the ICS (Nielsen, et al., 2017). It has to be noticed that the reputation of the promoting consultants/institutions appear to be determinant in the first stage of an ICR project: it stimulates the management in undertaking the project and investing time and resources on it and it allows overcoming the initials obstacles and grasping the attention of the managers. Similarly, the expected benefits appear to enforce the trust of the consultants/institutions and

on the project. In this case, it appears that the mentioned "IC grand theories" (Dumay, 2012) have a role in winning the initial scepticism and organisational inertia that characterises managerial innovations.

Nevertheless, reputation does not appear to be sufficient to guarantee a long-lasting success of the project: when the consultant abandons the project or the company or when the perceived benefits (see the performance) are not matching with the expected ones, the project fades.

4.2 Performance and IC reporting

Regarding the performance issues, the problems regarding the status of the ICR, the lack of clarity and of an understandable language, the gap between the expected benefits and the realised ones, the disclosure-related problems, the difficulties in measuring and understanding IC measurements and the high preparation costs are all aspects indicated by our interviewees. As often happens, the negative issues (preparation costs, technical and organisational problems, etc.) were weighted more than the positive ones (supporting discussions on intangibles, visualising the company IC, etc.) and then most of the ICR projects failed. This result is consistent with the one proposed by other scholars with reference to other countries (Nielsen, et al., 2017; Tee Jeok Inn, et al., 2015). The Italian experience also offers the possibility to reflect on the role of constraints, i.e. the fact that a report should be mandatory to survive. Most of the companies undertook and ICR project voluntarily, as they perceived it as useful. The demise was because the interest on the ICR vanished, as it was considered no more useful. In Denmark, as soon as the government stopped financing the ICR projects, almost all the involved companies stopped producing ICRs (Nielsen, et al., 2017). In Japan, it seems that the ICR initiative manages to survive because it is mandatory (Tee Jeok Inn, et al., 2015). Furthermore, the fact to be mandatory is not sufficient to explain the "success" of a reporting framework. In Italy, the CSR report is voluntary, but it managed to get institutionalised and, sometimes, even to fagocitate the ICR.

4.3 Appearance and IC reporting

With regard to the appearance, the collected evidence shows that in Italy the lack of unique guidelines or the flexibility of the ones proposed by the single consultants were not considered as relevant obstacles or issues that determined the failure of the ICR project. Some managers liked the idea to have the opportunity to offer "a picture" or, better, "their picture" of the company without any constraints and to have the possibility to adopt measurements that are designed specifically for their organisation. Of course, some managers, after the initial enthusiasm, started suffering from the lack of comparability, the limited understandability and the limited isomorphism of the designed indicators and consequently, they started searching for the "perfect indicators". Unfortunately, when this research started, the ICR project started its fade. These results enrich the ones achieved by other studies (Catasús and Gröjer, 2006; Chiucchi, 2013; Chiucchi, et al., 2018; Giuliani, 2016; Giuliani, et al., 2016; Guthrie, et al., 2012).

With reference to this dimension, the Italian experience differs from the Danish and the Japanese ones where national guidelines have been proposed and consequently, where companies had less flexibility. In this light, it seems that having guidelines that are "too flexible" is not a major issue as, in some cases, this flexibility is perceived as a "plus". On the other hand, adopting rigid and detailed guidelines in the name of "comparability" can lead to their rejection as they risk not to be able (or to be perceived as not able) to represent all the organizational specificities, especially the ones related to single intangibles and IC as a whole.

Regarding the appearance, it has to be considered that, in some cases, the implementation of an ICR was pushed forward also for increasing the visibility of the organisation or a single person. The ICR became a way to show that the company and/or the project sponsor were at the frontend in adopting new managerial technologies and by this becoming "testimonials" and increase their reputation and prestige. In this light, the ICR was more something to show rather than something to use.

4.4 Concluding remarks, implications, limitations and research avenues

The failure of the ICR experience in Italy can be due to the limited trust preparers and users had in this reporting tool: sponsors, leaders and users were probably "asking too much" to the IC report without having, in most of the cases, a clear and firm idea of what an IC report is. This disappointment has undermined the confidence required to the survival of the ICR project.

This paper contributes to the existing literature answering the call for more follow up studies about IC reporting (Nielsen, et al., 2017). Consequently, this paper contributes to the understanding of the reasons underlying the rise and fall of IC reporting and the future of IC research (Chiucchi, et al., 2018; Giuliani and Chiucchi, 2019; Nielsen, et al., 2017). In addition, the results achieved can contribute to understanding to what extent trust can influence the "fate" of a business reporting initiative (Chaidali and Jones, 2017).

In addition, from a practical perspective, this study suggests the importance of the project leader, the project sponsors and the external partners in determining the success of an ICR project. In addition, the study shows that the institutionalisation of a voluntary disclosure practice requires a consistent effort inside and outside the organisation in order to allow the internal and external stakeholders to make sense of it. Finally, this research suggests that there is a growing awareness of the inability of the financial statements to report the 'soft' dimension of a firm; nevertheless, managers tend to ask 'too much' to their IC reports. Thus, this seems to suggest that there is a growing interest towards more comprehensive forms of reporting such global reports or integrated reports that try to combine the financial dimension of an organisation with its non-financial one (intellectual, natural, social, etc.).

To conclude, this work presents some potential limitations. First, the results can be affected by the typical limitations of the design adopted for the study, that is, that a statistical generalisation is not possible and that the results may be subject to both interviewee and interviewer bias and interpretation. However, considering the exploratory nature of the study, an analytical generalisation of some aspects could be made. Second, the authors cannot be sure to have identified all the companies that have experienced the preparing of an IC report. Anyhow, the adopted methodology (Google search, interviews with consultants and academics, etc.) should have allowed identifying the most relevant ones as they are the ones proposed by scholars and practitioners as 'case study'. Third, it was not possible to interview all the identified companies. Nevertheless, the authors believe that the investigated cases offer a trustworthy picture of what happened in Italy. Forth, this study focuses on the Italian experience and, therefore, the results can be country-specific. Despite this, it has to be noticed that some of the achieved results are similar to the ones proposed with reference to the Danish and the Japanes cases.

This study calls for more research on ICR and the trust of preparers on it. This research can focus on the idea of trust as a whole as well as on its single dimensions (reputation, performance, appearance). Also, it calls for more studies about the internal and/or external use of IC reports and how stakeholders perceive them in practice. Finally, future research can investigate more in depth the single levers and barriers that are able to influence the success or failure of an ICR project.

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Agile Projects and big Data

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Abstract: In this paper, we explore the Agile approach to IT and big data project management and explain the benefit of agile methodologies for Big Data projects. The primary benefit of adopting an Agile methodology is its fluidity, this enables projects to adapt to changing assumptions, hypotheses, and requirements in a transparent way. Organizations are modernizing by using big data to power important decisions. They are refining agile approaches to Big Data problems and develop new techniques. An Agile approach is beneficial for big data projects because it allows analysts to gain valuable insights quickly, even from large data sets. This is possible by the way Agile projects break data sets down into smaller increments and is assisted by the continuous testing process. The paper reviews benefits of agile methodologies and explain how applying Agile IT methodology to Data Science Projects and Big Data Projects and why does Data Science need Agile methodologies.

1. Introduction

The electronic dictionary defines the word of agility in different ways, we list some definitions: "ability to move quickly and easily"…ability to think and understand quickly"… "the power of moving quickly and easily; nimbleness: exercises demanding agility" and "the ability to think and draw conclusions quickly; intellectual acuity". CEO's define agility using words like "rapid, culture, flexibility, transparency and availability". Organisational agility is the capability of a company to rapidly change or adapt in response to changes in the market. A high degree of organizational agility can help a company to react successfully to the emergence of new competitors, the development of new industry-changing technologies, or sudden shifts in overall market conditions, [Business dictionary].

Big data are extremely large data sets that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions. Big data is diverse and combines many different types of information, such as data from internal and external sources, as well as structured and unstructured data, (Davenport, 2014). Big data was originally associated with three key concepts: volume, variety, and velocity, (Laney, 2001). Other concepts later attributed to big data are veracity (i.e., how much noise is in the data), (Goes, 2014) and value. Big data challenges include capturing data, data storage, data analysis, search, sharing, transfer, visualization, querying, updating, information privacy and data source. SAS has suggested that 'variability', i.e. the variation in data flow rate (2016), may be an additional trait of big data (Mishra, et al., 2017). Similarly, 'visualization', the possibility to visualize digitally the insights from big data, has been considered a big data characteristic, (Lugmayr et al., 2017). This has expanded the number of V's to 7, namely: volume, velocity, variety, veracity, value, variability and visualization, (Mishra et al., 2017). Because of several successful implementations of Big Data Analytics systems within organizations, McAfee and Brynjolfsson identified big data as the next revolution in management. Big data analytics allow managers "to measure and know radically more about their business and to directly translate that knowledge into decision making and performance" (McAfee and Brynjolfsson, 2012), (Rialti et al., 2018).

New data discovery and data exploration technologies are being developed to provide greater flexibility. Data agility should be an important aspect of all big data initiatives in the future. Individuals can analyze and explore data directly. Self-service data exploration eliminates the dependency on IT to set up data definitions and structures, and frees up IT staff to perform more valuable and leveraged activities.

By implementing agile technologies such as Hadoop and Apache Drill into the enterprise and existing data management and analytics capabilities, we will be able to guide the organization's agility towards real-time business impact. Organizations are modernizing by using big data to power important decisions. They are refining agile approaches to Big Data problems and develop new techniques. An Agile approach is beneficial for big data projects because it allows analysts to gain valuable insights quickly, even from large data sets. This is possible by the way Agile projects break data sets down into smaller increments and is assisted by the continuous testing process. The main benefit of Agile Project Management is its ability to respond to issues as they arise

throughout the course of the project. Making a necessary change to a project at the right time can save resources and, ultimately, help deliver a successful project on time and within budget, (Torode and Pratt, 2019). Scrum is an example of an agile approach originated from agile software development. It assumes that software projects cannot be planned in detail prior to project beginning due to the complexity of such projects.

Planning is based on the principle of step-by-step refinement. This means that companies have the opportunity to react quickly and flexibly to changing environments. Scrum is a framework consisting of roles, rules, artefacts and events. It is designed for teams to add those practices needed in order to become Agile.

The paper reviews benefits of agile methodologies and explain how applying Agile IT methodology to Data Science Projects and Big Data Projects and why does Data Science need Agile methodologies.

Section 2 compares the traditional method and agile method and explains how agile methodologies contribute to the productivity of data-science development team.

2. Agility and big data

2.1 Big data's problem and the Agile solution

Traditionally, IT departments and business executives have used classic project management methods. Such techniques include establishing milestones and scheduling meetings to align business and technical staff. But those classic methods may not be enough to compensate for scientists' specialized knowledge and for business. Organizations can overcome these challenges by incorporating agile practices throughout big data analytics projects. This allow them to better focus on both their internal and external customers.

Agile is a methodology under which self-organizing, cross-functional teams sprint towards results in fast, iterative, incremental, and adaptive steps. Agile methodologies are taking root in data science, though there are issues that may impede the success of these efforts, (Kobielus, 2017). IT and big data projects are complicated by nature and reliant on assumptions being made, hypotheses being drawn, and these two things being continually tested. Adopting the Agile approach to project management will be the solution. Frustrations with the waterfall method naturally led software developers to improve the process by adopting agile ways. Agile is iterative, empirical, cross-functional, focused, and continually improving. Agile methods include assembling cross-functional teams, which improve communications and reduce handoffs, (when team members working in the same location). They also include developing minimum viable products (MVPs), rapid updates, and frequent feedback to ensure that the finished product delivers on expectations and goals, (see Figure 1).
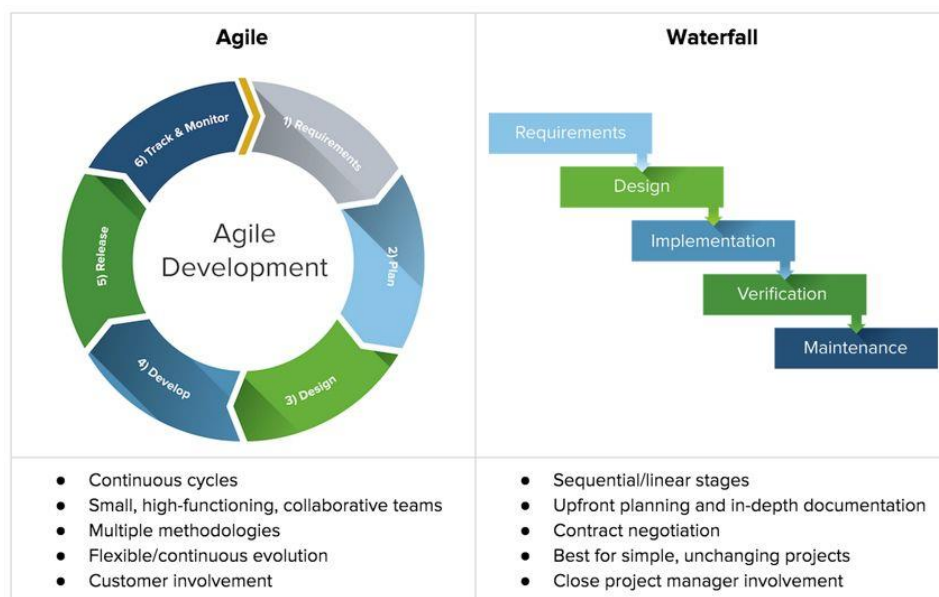
Figure 1: Agile cycle vs Waterfall model

Five steps may be required to create Insight systems that use more data and drive agility, (Morrell, 2018).

- Curate Data. Succeeding at data curation will give analysts access to more data, and give them access to the right data, in the right combinations and in the right form (so they can find answers faster and find new answers to tougher questions).

- Enable the Right Type of Self-Service. Armed with curated data, analysts need to be more productive and discover answers quickly and efficiently. The next step is to provide a self-service environment that will help make the analysts more productive and speed time to insight.

- Finding answers in big data is not the same as standard reporting. Big data is about coaxing the answers from the data. An open, experimental canvas is needed that lets analysts use their craftiness to create a work of art that finds well-hidden answers.

- Facilitate Collaboration. Each piece of the equation – data and analysis – has experts that can offer expertise to deliver the right results. Centralized centers of excellence are giving way to new organizational models that facilitate a de-centralized center of excellence that fosters common skills and collaboration, yet keep analysts embedded in the business.

- Incorporate that expertise and allow teams to work together to create the right solution. This requires security, governance and sharing of the data, analytic model and visualization levels.

- Operationalize Results. While many tools can help with analytic agility – producing results faster operationalizing results to make business move faster.

- Finding insights faster is important, but just as imperative is feeding proper in-context results to businesses so they can use them every day. This involves two key ingredients: (1) Mapping analytic results to outcomes and (2) operationalizing analytic jobs to run as needed and feed actions.

- Performing the latter requires robust job scheduling and monitoring facilities, scalable job execution capabilities to crunch the volumes of data and easy integration with downstream business processes and systems. Take advantage of these capabilities to create an operationalization plan that drive the right data to the right people as needed. Identify who needs to see the data, what they need to see, the outcomes they to drive and at what schedules – then execute this plan. This will facilitate the true business agility you desire.

- Embrace Change. Leading organizations know what to do with the data and how to use the data to change the way they do business. Big data analytics can help drive organizational, cultural and operational change, and companies need to embrace new ways of doing business and executing the marketplace.

2.2 The Agile project management

Agile project management is an iterative development methodology that values human communication and feedback, adapting to changes, and producing working results. Agile is iterative, meaning that it is done in pieces (sprints), with each sprint building and improving off the lessons learned from the previous sprint. This is where the Scrum framework comes into the equation. According to the 12 principles behind the Agile Manifesto: "The most efficient and effective method of conveying information to and within a development team is face-to-face conversation." Agile is all about producing tangible, working results after each iteration. Agile Project Management reduces complexity by breaking down the many-months-long cycle of building requirements for the whole project, building the entire product and then testing to find hundreds of product flaws. Instead small, usable segments of the software product are specified, developed and tested in manageable, two- to four-week cycles.

2.3 Agile project principles

There are 12 key principles that still guide agile project management:

- Customer satisfaction is the highest priority and is achieved through rapid and continuous delivery.

- Changing environments are embraced at any stage of the process to provide the customer with a competitive advantage.

- A product or service is delivered with higher frequency.

- Stakeholders and developers collaborate closely on a daily basis.

- All stakeholders and team members remain motivated for optimal project outcomes, while teams are provided with all the necessary tools and support, and are trusted to accomplish project goals.

- Face-to-face meetings are deemed the most efficient and effective format for project success.

- A final working product is the ultimate measure of success.

- Sustainable development is accomplished through agile processes whereby development teams and stakeholders are able to maintain a constant and ongoing pace.

- Agility is enhanced through a continuous focus on technical excellence and proper design.

- Simplicity is an essential element.

- Self-organizing teams are most likely to develop the best architectures and designs and to meet requirements.

- Regular intervals are used by teams to improve efficiency through fine-tuning behaviors.

2.4 Agile methods

Within agile there are some frequently used or popular methods, with Scrum, Kanban, and Lean being the most popular. Some agile methods include: Scrum, Kanban, Lean (LN), Dynamic System Development Model, (DSDM), Extreme Programming (XP), Crystal, Adaptive software development (ASD), Agile Unified Process (AUP), Crystal Clear methods, Disciplined agile delivery, Feature-driven development (FDD), Scrumban and RAD (Rapid Application Development).

Section 3 describes and illustrates Big data projects using Agility.

3. Big data projects using Agile methodology

Big data analytics detect patterns that would require considerably more time and effort to uncover using traditional analytics tools. Data scientists start big data projects with a theory about a business problem, such as how to predict demand for a car model on the basis of new features and past sales or how to determine how many employees an organization should hire to staff a new venture given existing personnel and previous staffing levels for similar projects, (Roghé et al., 2019). They then build algorithms to test the theory using one or more forms of artificial intelligence, machine learning, optimization, or traditional statistics on a massive scale. If the theory is shown to be false, they may continue refining and testing it until they reach a valid conclusion. The results of big data analytics can be remarkable. The problem is the manner in which big data analytics are developed. Some ones are built sequentially, applying the waterfall method of project management traditionally used in software development. In the waterfall method, data scientists acquire, verify, and integrate data; develop a model or algorithm to test it; run the test; and then either act on the results or continue refining the model. Work on one task waits until the preceding task is finished. To overcome deficiencies with the waterfall method software developers improved the process by adopting agile ways of working. In the process of unlocking those insights, data science professionals may build, test, and discard one model after another until they find the one that fits the data best and identifies the specific correlations and other patterns of interest.

To ensure that agile methodologies contribute to the productivity of data-science development team, Agile should be bring into data science team development processes, deploy Agile-enabling data science development tools and platforms, and ensure that Agile processes don't compromise data-science reproducibility. On the other hand, we must instil a steadfast commitment to reproducibility into the culture and training of all data-science professionals, (Kobielus, 2019).

3.1 Bring Agile into data science team development processes

Agile breaks down to the core principles, with specific emphasis on how one might apply these Agile practices to a typical data science development initiative: building, testing, deploying, and refining the analytic algorithms that optimize an enterprise's digital-marketing applications, (Kobielus, 2019).

3.1.1 Applying Agile principles to the data science development process

Step one
Principle: Start from the "minimum viable product"

Definition: The "minimum viable product" from a data science initiative is whatever deliverable adequately addresses some narrowly scoped business requirement using a minimal set of resources and tasks.

Scenario: In a digital marketing scenario, this minimal deliverable might address some narrow requirement such as predicting a single scenario (e.g, whether one class of customers might accept one specific offer under tightly constrained circumstances). The application might be built from a single data source (e.g., relational customer database), incorporate just a few predictive variables into their feature set (e.g., customer gender and income), use just one well-understood statistical algorithm (e.g, linear regression), and few lines of programming code and other deterministic business rules (e.g., Python scripting in Linux). Predictive model that's more accurate than random guessing." On the recent Crowdchat, one participant defined data-science MVP thus "MVP can simply be a predictive model that's more accurate than random guessing."

Step two

Principle: Build deliverables modularly from the minimum viable product

Definition: The "minimum viable product" from a data-science development exercise might serve as the modular foundation for a more complex application that addresses other requirements.

Scenario: Using the example above, the core predictive app might be extended by other developers to address other scenarios (e.g, whether that same class of customers might accept other offers under different circumstances), leveraging other data sources (e.g., customer clickstreams from mobile commerce apps), more predictive variables (e.g., location, time of day, education level), and other algorithms (e.g, logistic regression for more fine-grained customer segmentation). Other code modules might be added as the application is elaborated to evolve beyond simple prediction toward classification and automated responses.

Step three

Principle: Evolve deliverables Incrementally

Definition: As each data-science application module gets developed, tested, and deployed–starting from the initial "minimum viable product"—it becomes part of the platform upon which future modules are incrementally built.

Scenario: Staying with the example above, the incremental customer predictive-response application modules might figure into a target-marketing application that uses predictive analytics and business rules to send tailored offers to specific customer segments based on both historical and current data. As each incremental module is built out, it would draw from the core data, algorithms, features, code, and rules used in previous modules, but may also incrementally evolve these artifacts to address the special requirements of each subsequent module.

Step four

Principle: Use iterative steps at each phase to refine deliverables

Definition: In the process of developing each incremental module of a data science initiative, agile methodologies call for regular—perhaps daily or weekly—checkpoints in which developers come together to discuss changing requirements and review progress of each iteration of the proposed solution.

Scenario: In the example above, these regular checkpoint meetings would involve face-to-face discussion (where feasible) to provide feedback on project status, identify suitable data sources, assess data-engineering requirements, review feature sets, discuss algorithms, critique coding, evaluate performance, and grapple with myriad other issues that surround each iteration of whatever predictive-analytics module they're developing. Depending on the turnaround requirements of the project, these iterative "sprints" may be short or long in duration, and may catalyze fast results or risk compromising the more careful drawn-out planning needed on some complex projects."

Step five

Principle: Adapt methodologies to changing project results and circumstances

Definition: Throughout the development lifecycle of any data science project, the team will flexibly adapt its structure, membership, dependencies, workflows, tasking, and technical approach to changing circumstances.

Scenario: In the example above, a data-science development team may at various checkpoints realize that the data sources, sampling techniques, feature engineering, statistical algorithms, runtime environments, programming languages, and other aspects of their initial plan have proven counterproductive. The realization that a modification is necessary will usually come from varying blends of user direct feedback, comments from various development team members, and/or from the success (or lack thereof) of each version of a

model to achieve intended learning outcomes. As data-science team members collaboratively work through these issues, they may, with each new Agile "sprint," adapt by trying different customer data sources, building models around different regression and classification algorithms, bringing in different digital-marketing experts to refine the feature model, executing the models in a public vs. a private cloud, and so on. Throughout the process, the adaptive data science team will report milestones toward successful delivery, and cannot commit to specific interim task completions, as these cannot be predicted with certainty in the self-organizing, trial-and-error nature of a project with many unforeseeable variables.

Step six
Principle: Colocate team members to keep collaborations focused in real time
Definition: Under the agile approach, most of the teams' participants and interactions take place in common physical location, or, as a second-best alternative, in a physical hub which some participants access remotely through regular video, audio, and other conferencing, collaboration, and other resource-sharing tools. The "minimal viable team" must always be co-located.
Scenario: In the example above, agility requires that the core developers of the predictive marketing application–in other words, data engineer, statistical modeler, marketing specialist, data app coder—engage, at the very least, in weekly in-person checkpoint conversations. They may, however, engage other, remote personnel at various points in the data-science development pipeline. One example of the latter might be the administrators of the Hadoop-based data lake and the Kafka-based data streaming infrastructure upon which their project depends.

3.1.2   Agile data science principles

An overview of the principles is presented in Figure 2.
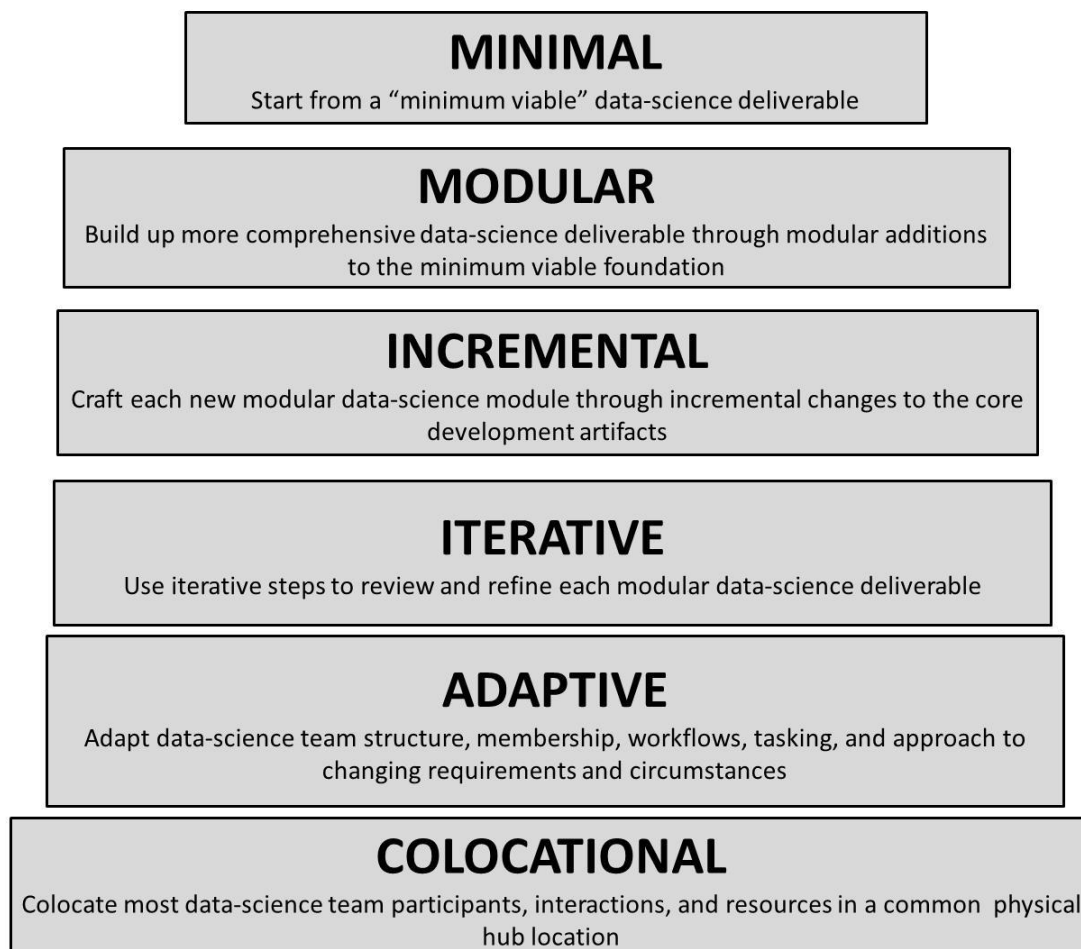
Figure 2: Agile data science principles (Kobielus, 2019)

3.2 Deploy Agile-Enabling data science development tools and platforms

For data science professionals within Agile development teams, productivity can be difficult to sustain if their modeling tools, algorithm libraries, and data platforms are disparate and fragmented. Though statistical modelers, data engineers, business analysts, visualization designers, and other data science professionals have distinct roles in the development of data-science deliverables, they require a common hub for resource sharing, version control, and other core tasks essential to their incremental, iterative, and adaptive collaborations on common projects. To support productive collaborations within Agile development environments, data science professionals require access to a common working environment with core features outlined below.

- Rapid deployment: The environment should be deployable and useful to developers in less than an hour, and decommissioned just as easily, at no risk and with no infrastructure investment required.

- Unified toolset: The environment should support unified access into data, algorithm libraries, code modules and other assets on existing platforms, into runtime engines and pipeline processes that be executed those platforms, and into facilities to move data and workloads between platforms.

- Elastic scalability: The environment should facilitate flexible scale-up and scale-out from a small data-science platform as needs change, with the ability to elastically add, remove, and redistribute storage, processing, memory, bandwidth, and other resources on demand.

- Comprehensive data lake: The environment should allow rapid inclusion of a growing variety of data types from diverse sources into a comprehensive data lake available for all data-science pipeline processes.

- Self-service data discovery and acquisition: The environment should enable self-service discovery and acquisition of data from diverse database, big data clusters, cloud data services and other data sources.

- Flexible modeling, programming, and prototyping: The environment should enable modeling, programming, and prototyping of data applications in Apache Spark, R, Python and other languages for execution within in-memory, streaming and other low-latency runtime environments.

- Composable application and service workbench: The environment should streamline development of data-driven applications and microservices using a reusable, composable library of algorithms and models for statistical exploration; data mining; predictive analytics; machine learning; natural-language processing; and other functions.

- Pipeline automation: The environment should automate end-to-end machine-learning processing across myriad pipeline steps—data input through model training and deployment—and diverse tools and platforms through support for standard application programming interfaces.

- Continuous benchmarking and iterative refinement: The environment should support continuous benchmarking of the results of data-science projects to enable iterative refinement and reproducibility of model and algorithm performance.

- Lifecycle policy-based governance: The environment should enforce policy-based governance, security, tracking, auditing, and archiving of data, algorithms, models, metadata and other assets throughout their lifecycles.

Section 4 illustrates a concrete example of an agile management project.

4. Illustration

The concept of Agile project management has become mainstream, with one of the most significant adopters being Google. Google gave a presentation at the recent Agile Business Conference in London, sharing the insights gained during "Project Aristotle," an initiative designed to help the company understand team effectiveness, (Rochester, 2019). They claimed that:

- "Psychological Safety" is one of the single most important dynamics of a successful team. This means that team members are free to take risks, ask questions, make mistakes, and challenge conventions without suffering negative consequences. The Agile approach can help with this, by allowing projects to adapt to experimentation more easily.

- The company makes use of an internal process that has become known as "dogfooding." This refers to a business using its own products internally within the workplace on a daily basis. The key advantage is that it allows the business or project team to test its products in a way that exactly replicates their real-world usage before releasing them to the public.

- This process ties in strongly with the Agile approach to project management because it means that employees using the products during their day-to-day work activities can test their functions, evaluate the coding, and validate the numerous assumptions the projects are built on. It can start to take place prior to the product being released to the general market, but it can also continue after the project's eventual roll-out.

- As a result, failures can be identified and corrected. They can be learned from much earlier in the project's life cycle than they would be with other approaches to project management. This means that any alterations or adaptations can be made with minimal disruption and, in many cases, before end users are affected.

- A solid DevOps course, with an emphasis on Agile project management, can help project managers, analysts, and directors to implement a more fluid methodology. The methodology itself centers on cross-functional collaboration and on testing occurring earlier in the project life cycle. This leads to minimal disruption and lower overall project costs; with a view toward developing bug-free projects, free from issues.

Section 5 is a discussion and conclusion of the research paper.

5. Discussion and conclusion

The primary benefit of adopting an Agile methodology is the fluidity it provides. This enables projects to adapt to changing assumptions, hypotheses, and requirements, and allow IT and big data projects to change direction entirely, without having to start over. However, more typically, it allows for smaller changes to be made and for these changes to be made easily and early. A high-quality Agile project management training program can allow project leaders and their businesses to adapt to unexpected changes in budget or consumer expectations without the entire project becoming derailed. It can therefore reduce risk and result in lower overall project costs. An Agile approach can be especially beneficial when it comes to big data projects because the approach allows analysts to gain valuable insights quickly, even from large data sets. This is primarily made possible by the way Agile projects break data sets down into smaller increments and is also assisted by the continuous testing process. Agile can help in the delivery of more timely applications in 'big data' projects, largely due to better collaboration between business and development. Agile works with big data because Agile is iterative, incremental and evolutionary. Once data is available, and can be used for statistical analysis and modelling the agile approach involving either full-fledged data scientists, or a multidisciplinary team of statistical analysts and business domain experts supported by an IT developer would again be useful, with successive iterations of work leading to discovery of insights and a refined model. Once the model is validated it can then be introduced to the business with appropriate training so that they can continue to use it on their own moving forward.

Testing and test automation presents a unique challenge in analytics. There are two aspects to testing: ensuring that the analytical code is written correctly, and ensuring that the model is both valid and accurate. The first of these is relatively straight forward. Tests can be reliably written for functionality such as loading a data file, deriving a new independent variable (data attribute), ensuring data completeness, consistency, and correctness. These tests can be written in a test-first fashion by data scientists but as mentioned earlier, many early models are disposable. Therefore, data scientists may not write tests initially until a model appears to have promise. The second aspect of validation is more challenging. Analytical models are probabilistic by nature. This means that there will always be false positives and false negatives. For example, some customers who are predicted to attrite will never do so, and some who are not predicted to attrite will. Data scientists use the scientific method to validate analytical models and determine their accuracy, while business experts verify their utility. These latter tests are not typically included in a continuous integration test suite, but the former tests are.

With so many positives to be gained from incorporating agile into big data projects, companies might be tempted to dive in right away. But getting the best outcomes takes substantial planning, including a thorough examination of what is needed and how it would affect existing personnel and processes. Conducting a pilot is a good way to start. If it succeeds, agile can be added to more big data programs, a step that requires thinking about how to set up teams and get customer feedback.

Systems of insight is a great new way of looking at big data analytics, especially in terms of the impact it can have on the business. Greater business agility is the modern objective of big data analytics, and it's important to embrace how the organization can use new big data analytics to facilitate the changes necessary to achieve agility.

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Agile and Organizational Learning

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Abstract: The goal of this paper is to explore learning in agile organizations. Organizational learning (OL) is the process of creating, retaining, and transferring knowledge within an organization. An organization improves over time as it gains experience. From this experience, it is able to create knowledge. Knowledge is created at four different levels: individual, group, organizational, and inter organizational. OL helps improve organizational actions through better knowledge and understanding. Nowadays many learning strategies are focused on transforming the company into a "learning organization". A learning organization, as defined by several authors, is one that continuously facilitates learning for its people and transforms as needed. Key characteristics of a learning organization are systems thinking, challenging the status quo, continued growth for teams and individuals, and common understanding of a shared vision. All of these things are still relevant and needed, but it isn't enough for an organization to just become a learning organization; it also needs to rethink how it is organized. Agility is becoming the optimal solution for companies in thinking about how they structure teams to perform work. Agile methodology began with software development, however, its focus is on adapting to change rather than following a process. Organizational Learning (OL) may be very relevant to support the generation of organizational competitive advantage. Learning agility is the ability to continually and rapidly learn, unlearn, and relearn mental models and practices from a variety of experiences, people, and sources, and to apply that learning in new and changing contexts to achieve desired results. In this context, we discuss how organizational learning agility is enhancing the collective ability to acquire new knowledge and skills. We identify practices to effectively share tacit and explicit knowledge; show how team members learn and gain knowledge, from experience, and analyze how teams develop conceptual frameworks and interpret these experiences. We illustrate these concepts by a case study based on multiple case studies and own experience and reflection.

Keywords: organisational learning, agile organization, case study

1. Introduction

Organizational learning can be conceived as having three sub-processes: creating, retaining and transferring knowledge. When organizations learn from experience, new knowledge is created in the organization. The knowledge can be then retained. Knowledge can also be transferred within and between units. Through knowledge transfer, one unit is affected by the experience of another (Argote and Ingram, 2000) or learns vicariously (Bandura, 1977) from the experience of other units (Argote, 2011). The study of organizational learning directly contributes to the applied science of knowledge management (KM) and the concept of the learning organization. Organizational learning is related to the studies of organizational theory, organizational communication, organizational behavior, organizational psychology, and organizational development. Organizational learning has received contributions from the fields of educational psychology, sociology, economics, anthropology, political science, and management science (Wikibooks, 2019).

The most common way to measure organizational learning is by using a learning curve. Learning curves are a relationship showing how as an organization produces more of a product or service, it increases its productivity, efficiency, reliability and/or quality of production with diminishing returns. Learning curves vary due to organizational learning rates. Organizational learning rates are affected by individual proficiency, improvements in an organization's technology, and improvements in the structures, routines and methods of coordination. Agility is becoming the optimal solution for companies in thinking about how they structure teams to perform work (Argote, 2013).

Agility is the organization's ability to rapidly respond to changes in demand. Based on Li et al. (2011) agility can be defined by four dimensions: *social agility, organizational agility, agile communities* and *ecosystem agility*. *Social agility* includes individual and team performance improvement through easier and faster interactivity on common business objectives. *Organizational agility* is based on the premises of boundary-less organizational structure which enables knowledge sharing and collaboration both internally, with other divisions and externally with business partners*. Agile communities* are societies built based on social and organizational agility.

Ecosystem agility includes the use of social technologies in business to sense and manage the relationships in their business ecosystems to gain competitive advantage.

"Agility can be seen as an ability of an organization to know the business environment (customers, competitors, suppliers,...etc.) and respond to change in time. Thus, it is more than flexibility – it is responding in a "right" place in a "right time (Tikkamäki and Mavengere, 2013). Being agile requires employees' and managers' ability to learn as well as taking care of the learning processes.

Learning agility is the ability to continually and rapidly learn, unlearn, and relearn mental models and practices from a variety of experiences, people, and sources, and to apply that learning in new and changing contexts to achieve desired results. Learning agility is the ability and willingness to learn from experience, and then apply that learning to perform successfully under new situations (De Meuse et al., 2009).

Glaring difference between successful people and those whose careers falter is that the ability of the former to wrest meaning from experience (i.e., learning agility) (McCall, Lombardo, and Morrison, 1988).

Organizations gain knowledge in one of the four organizational communities of learning: individual, team, organizational, and inter-organizational. Organizational learning "involves the process through which organizational communities (e.g. groups, departments, and divisions) change as a result of experience." An example of organizational learning is a hospital surgical team learning to use new technology that will increase efficiency (Argote, 2011).

In this context, we discuss how organizational learning agility is enhancing the collective ability to acquire new knowledge and skills. We identify practices to effectively share tacit and explicit knowledge; and show how team members learn and gain knowledge, from experience, and analyze how teams develop conceptual frameworks and interpret these experiences. We illustrate these concepts by a case study based on multiple case studies and own experience and reflections.

Section two defines both the concepts of agility and organisational learning (OL) using illustrations and examples.

2. Agile and organisational learning (OL)

Organizational learning is the process of creating, retaining, and transferring knowledge within an organization. An organization improves over time as it gains experience. From this experience, it is able to create knowledge. This knowledge is broad, covering any topic that could better an organization.

2.1 Agile

Agile is the ability to quickly and flexibly respond to changing business environments and stakeholders'/customers' expectations. Being agile means constantly being adaptive to change. A milestone in the coining of the term "agile" was the publication of the "Manifesto for Agile Software Development (Agile Manifesto)" (Agile Manifesto, 2001).

2.2 Learning agility

2.2.1 Definition

Learning agility is about the flexibility to approach situations from multiple perspectives and the speed of learning new things. This flexibility and speed means that people who are learning agile, have the ability to incorporate new skills into their current skill set quickly and efficiently, while at the same time unlearning ineffective skills with the same efficiency and speed (DeRue et al., 2012).

2.2.2 Learning agility model

Learning agile behaviour can take several forms. Where one person proves to be effective in new situations because he/she is keen on experimenting different approaches, others might thrive because they are intrigued by the new situation and happy to analyse it to the full extent. Learning Agility can thus be seen from different angles. Therefore, the Learning Agility construct consists of four domains: Change Agility, Mental Agility, People

Agility, and Results Agility; and one transcending factor, Self-awareness. These domains are explained in more detail below (Haring et al., 2019).

Figure 1 illustrates the concept of Learning Agility.

Figure 1: The learning agility model

This model illustrates that:

- A constant curiosity. Interest in experimenting, trying new things and a passion for new experiences. Be able to learn best from its own experiences.

- Enjoy using new ideas to create new insights when things are complex or unclear.

- Be open to people with different backgrounds and opinions. A need to properly understand what others mean and take others opinions seriously.

- Desire to be successful and always look for the best way to achieve results. Better able to set goals and retaining focus in new and unfamiliar situations.

- Knowing its own strengths and weaknesses. Critical of its own performance and actions. Keen to know how they can do things better and willingness to learn.

2.3 Organisational communities

Organizations gain knowledge in one of the four organizational levels of learning: *individual, team, organizational, and inter-organizational*. *Organizational learning* "involves the process through which organizational communities change as a result of experience (Argote, 2014).

2.3.1 Individual learning

Individual learning is the core/prime level at which learning can occur. An individual learns new skills or ideas, and their productivity at work may increase as they gain expertise. The individual can decide whether or not to share their knowledge with the rest of the group. If the individual leaves the group and doesn't share their knowledge before leaving, the group loses this knowledge, (Wilson et al., 2007). In their study of software development, Slaughter and Espinosa (2007) found that individuals were more productive the more specialized experience they had with a certain system (Argote, 2011).

2.3.2 Group learning

Group learning is the next higher level (Wenger, 1998). There are conflicting definitions of group learning among researchers who studied it: (1) *group learning* is a process in which a group takes action, gets feedback, and uses this feedback to modify their future action (Sole and Edmondson, 2002), (2) *group learning* happens when a member shares their individual knowledge with other group members, (3) *group learning* is primarily a process

of error detection and correction (Argyris,C. and Schön, 1995) and (4) *group learning* is primarily about the processes of interpretation and integration (Crossan et al., 1999).

2.3.3 Organizational learning

Organizational learning is the way in which an organization creates and organizes knowledge relating to their functions and culture. Organizational learning happens in all of the organization's activities, and it happens at different speeds. The goal of organizational learning is to successfully adapt to changing environments, to adjust under uncertain conditions, and to increase efficiency (Dodgson, 1993). According to Argote (1993) managers in manufacturing plants saw organization learning occur when they found ways to make individual workers more proficient, improved the organization's "technology, tooling, and layout," improved the organization's structure, and determined the organization's strengths (Argote, 1999).

2.3.4 Interorganizational learning

Interorganizational learning is the way in which different organizations in an alliance collaborate, share knowledge, and learn from one another. An organization is able to improve its "processes and products by integrating new insights and knowledge" from another organization (Tucker et al., 2007). Learning from another organization can mean applying the same ideas used by that organization or modifying these ideas, thereby creating innovation (Tucker et al., 2007).

2.4 Organizational learning processes: Creating, retaining and transferring knowledge

Two distinct forms of knowledge, *explicit* and *tacit*, are significant in this respect. *Explicit knowledge* is codified, systematic, formal, and easy to communicate. *Tacit knowledge* is personal, context-specific, subjective knowledge.

- Explicit knowledge is knowledge that is easy to transfer. Unlike tacit knowledge, explicit knowledge is declarative or factual. It is transferred through written, verbal, or codified media. Examples of this include instructions, definitions, and documents.

- Tacit knowledge is knowledge that is difficult to transfer. As first described by Michael Polanyi, tacit knowledge is the knowledge of procedures. It is a personal type of knowledge that cannot be shared simply through written or verbal communication. It is learned mostly through experience over time. This knowledge can only be transferred to new employees through practice and experience (Polanyi, 1962).

2.5 Organizational learning and agile capability: Spiritual tacit knowledge

Organizational learning and agile capability are also based on the contribution of emotional and spiritual knowledge, Bratianu and Bejinaru (2019). It has been proven that considering only tacit knowledge and explicit knowledge could be difficult to work with it. Indeed, "tacit knowledge represents a conglomerate of forms of knowledge." Inspired by the cognitive sciences three fundamental fields of knowledge are considered: *Rational knowledge field, emotional knowledge field,* and *spiritual knowledge field.*

These fields are identified at individual level, by the analogy with the traditional belief in mind, heart, and spirit, and at organizational level by the analogy with the nonlinear integrators of management, organizational culture, and leadership, (Bratianu and Bejinaru, 2019).

Spiritual tacit knowledge is seen as knowledge relating or emanating from the soul realm. Bennet and Bennet (2007) contend that the soul represents the stimulating component of human life in forms of thought and action, specifically focused on its moral aspects, the emotional part of human nature, and higher development of the mental faculties. Bennet and bennet (2008) claim our existing state knowing of the evolution of our understanding of spiritual knowledge is such that there are insufficient words to relate its transcendent power, or to define the role it plays in relationship to other tacit knowledge. Nonetheless, this area represents a form of higher guidance with unknown origin. Zohar and Marshall (2004) consider spiritual intelligence the third fundamental intelligence after cognitive intelligence and emotional intelligence. In their view, spiritual intelligence "is the intelligence with which we have access to deep meaning, fundamental values, and a sense of abiding purpose in our lives, and the role that this meaning, values and purpose play in our lives, strategies, and thinking processes" (Zohar and Marshall 2004, p. 64).

Spiritual intelligence may work as integrator assisting in understanding our identity and sense of life. Also, it helps us to construct a vision based on our potential rich in rational, emotional, and spiritual knowledge. Thus, it might be considered as a driving force in conceiving and implementing strategies in concordance with our set of values or mindset. Spiritual intelligence is a real transformational force which is fundamental for spiritual leaders (Bass and Riggio 2006; Benefiel 2005; Daft 2008). They should be able to create a shared vision based on a set of organizational values and ethical principles.

Zohar and Marshall describe spiritual tacit knowledge as, ... the intelligence with which we address and solve problems of meaning and value, ... place our actions and our lives in a wider-richer meaning-giving context, [and] ... can assess that one course of action or one life-path is more meaningful than another" (Zohar and Marshall, 2000, pp. 2-3).

The effect of emotional capability, involving the dynamics of encouragement, displaying freedom, playfulness, experiencing, reconciliation, and identification constructs on the firm innovativeness (i.e., product and process) is interestingly missing in the technology and innovation management literature. In this context many research papers and case studies put in value the contribution of emotional and spiritual knowledge for organisational learning and agility, (Akgun et al., 2009).

Section three deals with the methodology and methods adopted in organisational learning.

3. Methodology: Multi-Methods

Organizational learning tracks the changes that occur within an organization as it acquires knowledge and experience. To evaluate organizational learning, the knowledge an organization creates, transfers, and retains must be quantified. Organizational learning is composed of concepts that are difficult to quantify. Measuring organizational learning requires combining different types of methodologies. Using multiple methods will facilitate research on organizational learning. Both qualitative or interpretive and quantitative methods hold promise for advancing our understanding of organizational learning (Li et al., 2009). A new quantitative approach that lead to important insights builds on developments in neuroscience that will enable to see which parts of the brain are activated (Senior et al, 2010). Physiological measures also allow for studying emotion and organizational learning, an under-researched topic that would benefit from additional study. The various physiological techniques show promise for helping to understand the mechanism through which organizational learning occurs (Argote, 2013).

Agile working methods prove to be successful in innovation and where rapid progress frequently turns out to be the better approach over perfectionism. Agile methods function best in departments strongly linked to direct and indirect market influences (e.g. marketing, sales, product development, R&D, etc.) as well as project management cross-functions. In departments that focus primarily on the identification, avoidance and prevention of errors and risks, agile working methods prove to be less successful and initial experiences do not indicate progress in this direction. Finance/Risk/Compliance (FRC), accounting and controlling are examples of such areas. If the Agile Organization concept is to function in these sectors, it will be necessary to balance both tension and correlated implementation difficulties between agile and traditional working methods. In terms of agile methods, success factors and priorities for an Agile Organization and this large variation, a development of frameworks is needed, taking into four dimensions: Organizational Culture, Leadership and Governance, Organizational Structure and Processes, Tools and Technology.

Section four introduces ways of working to develop new technologies and agility tools.

4. New technologies

Learning organizations are organizations that actively work to optimize learning. Learning organizations use the active process of knowledge management to design organizational processes and systems that concretely facilitate knowledge creation, transfer, and retention. Organizational metacognition is used to refer to the processes by which the organization 'knows what it knows'. The study of organizational learning and other fields of research such as organizational development, system theory, and cognitive science provide the theoretical basis for specifically prescribing these interventions (Senge, 2010).

Learning organizations also address organizational climate by creating a supportive learning environment and practicing leadership that reinforces learning (Edmondson et al., 2008). Creating a supportive learning environment and reinforcing learning depends on the leadership of the organization and the culture it promotes. Leaders can create learning opportunities by facilitating environments that include learning activities, establishing a culture of learning via norms, behaviors, and rules, and lead processes of discourse by listening, asking questions, and providing feedback. Leaders must practice the individual learning they advocate for by remaining open to new perspectives, being aware of personal biases, seeking exposure to unfiltered and contradictory sources of information, and developing a sense of humility (Garvin, 2000).

New knowledge management systems enabled by Web 2.0 technologies have the potential to affect organizational learning and knowledge management more positively than previous generations of systems. While previous systems operated more as knowledge repositories and directories of declared expertise, new systems provide communication capabilities as well as the capability to identify experts based on who provides answers to queries. The communication capabilities provide rich media for transferring knowledge; expertise identified through the system may be more accurate and useful than self-declared expertise (Argote, 2011).

Forward-thinking organizations have already developed a number of different tools, or ways of working, to develop these five types of agility (see table 1):

Table 1: Tools and types of agility from (Marshall-Lee, 2019)

Principles	Current tools
Strategic agility	• Business model innovation (including managing different business models concurrently) • VUCA-prime: Vision, Understanding, Courage, Adaptability • Environmental scanning: regular, disciplined, expansive (technological, sociological, ecological, economic and legal scans) • Inspire an agile culture: employees and partners
Customer agility	• 'Datafy' every customer exchange: learn what they truly value and create insight feedback loop to continually improve • Small, mission-based teams empowered to make the right decisions for the customer • Employees enabled to quickly string together experimental products and services, test the market, and scale ideas that have a positive response
Partnering agility	• Platform/ eco-system structure: APIs and consistency of data to enable frictionless data flow • Open innovation • Build networks & circle of influence
Operational agility	• Lean management tools: 'the startup way' (Eric Reis)– constantly questioning if processes still adding value or could be done more simply • Continuous innovation • Shared and emergent leadership • Flexible working • Automate as many operational decisions as possible/ and AI supported decision-making
Learning agility	• Shift everyone's mindset: Actively overcome insight inertia, action inertia and psychological inertia • Support risk-taking (with limited blast radius) and safety to fail fast and learn • Encourage individuals and teams to build their own learning ecosystem • Reward flexibility, speed, experimentation with reflection and feedback-seeking

Section five is the illustration of a case study developed by the HFMtalentindex organisation (Haring et al., 2019). This case study focus on specific case studies that corroborate previous results and provide evidence of HFMtalentindex's Learning Agility assessment as an effective tool for selection and development.

5. Learning agility in practice - case studies

Due to the material interest in Learning Agility many clients investigated the potential of using Learning Agility as an assessment tool.

5.1 Correlation between the data set used for statistical analyses and the organizational learning

Research studies have concentrated extensively on the relationship between perceived environmental uncertainty and organizational characteristics such as firm size, strategy, structure, and performance measures (Gordon & V.K.Narayanan, 1984; Gul. & Chia., 1994); for instance, empirical studies by Gordon and Narayanan (1984), Chenhall and Morris (1986) and subsequently Gul and Chia (1994) found that perceived environmental uncertainty is associated with the characteristics of management accounting information. Hair et al. (2006) recommended validating statistical analysis results with the following three procedures:

- Split the sample into two halves and use one subsample to estimate the model while keeping the other half for validation;

- Collect a new set of data from different participants from the same population; and

- Use a bootstrap technique to draw random subsamples from the sample. Depending on the capability of the computer, researchers can draw subsamples 1,000 or 2,000 times, estimate the interested parameters, and calculate their expected ranges.

The study will investigate whether there was a relationship between:

- perceived individual learning (independent variable) and perceived team learning (dependent variable);

- perceived individual learning (independent variable) and perceived organizational learning with three components (dependent variables);

- perceived individual learning, or perceived team learning (independent variable), and a component of perceived organizational learning (dependent variable).

5.2 The case study

HFMtalentindex collected Learning Agility data from a wide variety of sources and to use that data to investigate the relationship between Learning Agility and other concepts. The results are based on an anonymous data sample of over 17,000 people from a wide variety of HFMtalentindex's clients. This study includes:

- Learning Agility, Performance and High Potentials.

- Learning Agility and Performance Over Time.

- Education and Learning Agility.

- Age and Learning Agility.

- Gender and Learning Agility.

- Learning Agility by Region.

- Learning Agility and Sector Strengths.

- Learning Agility Benchmarks.

5.3 Learning agility, performance and high potentials

Steps are as follows:

- Establish the relationship between Learning Agility and current performance.

- Learning Agility scores of individuals were analysed in relation to a 360 performance evaluation on competencies relevant to their current function.

- The type of performance evaluations spanned multiple different functions, ranging from consultants, sales managers, cashiers, accountants, secretaries, engineers to directors, thus ensuring a diverse data set.

- The evaluations dated from 2015 onwards, guaranteeing the data was current and representative of the current workforce.

- A correlation analysis was conducted to investigate the relationship between Learning Agility and recent performance.

5.4 Learning agility and performance over time

Questions:

- What is the link between Learning Agility and someone's performance within the same function over time?

- Do those high on Learning Agility improve their performance within the same function, thus mastering the more demanding and complex jobs within their function?

- Are they able to learn and adapt, while ensuring that they strengthen their foothold within what they are currently doing?

- Do they do this more so, than those who score low on Learning Agility?

Answers

- A data set was compiled containing individuals with a 360 feedback performance evaluation of the same function at time 1 and at time 2 (usually a year later).

- Using this data set, a correlation analysis was conducted between Learning Agility and its domains against the change in performance over time.

- A high positive correlation was found between People Agility and Self-awareness on change in performance; 0.48 and 0.40 respectively.

- The analysis was taken a step further, looking at both intelligence and competencies separately in relation to change in performance over time.

- The results of which bolsters the efficacy of using Learning Agility as a tool, with a clearer relationship between Learning Agility and improvements in performance over time than the other two constructs.

- The relationship between Self-awareness and the change in performance is self-evident, with those who are aware of their strengths and weaknesses, utilising that information to their benefit and accept feedback from others.

- A strong link with People Agility, indicating that those who learn best from others and seek other perspectives on how to tackle certain problems, are the ones who will improve their performance most over time.

5.5 Results

Education and Learning Agility

- The relationship between the highest education level completed by the candidate and Learning Agility was investigated (the data set consists of HFMtalentindex's clients, which represents a diverse and international group).

- The education variable consisted of three levels: vocational education, higher vocational education, and university.

- There was a strong correlation between education completed and Learning Agility, with the strongest correlation between the education variable and overall Learning Agility (0.32).

- The other domains correlated highly with education level completed (range: 0.27 to 0.29), except for People Agility which is considered to be low (0.10).

5.6 Age and learning agility

- What group differences can be seen between different cohorts of people from different generations?

- Could one cautiously hypothesise about outcomes of longitudinal studies investigating changes to individuals' Learning Agility profiles as they get older?

- The research results presented are based on cohort analyses of people of distinct age groups.

5.7 Gender and learning

- The data indicates a difference between men and women on a group level, on Learning Agility and its domains, with relatively small but significant differences.

- It can be concluded that on average, the two groups differ in their approach to learning.

- The relation between education and Learning Agility: one will be interested in differences between individuals (selection) or in strengths and weaknesses in one's Learning Agility profile (development), and not so much in differences between groups.

5.8 Learning agility by region

- This was the first time regional differences was used as a variable in relation to Learning Agility, as a result there were no previous ideas on how the two would relate to each other.

- This exploratory analysis was conducted on HFMtalentindex's data that consisted of a diverse group of participants from different continents. 4

6. Discussion and conclusion

Transforming an organization towards a more agile one depends on key success factors and certain challenges that have to be met along the way. Old structures have to be reorganized and employees have to be actively involved. There are upcoming questions such as "Are managers prepared to take more risk and accept early set-backs?", "Which level of employee super-vision is the right one?", "How is it possible to remunerate extraordinary efforts and how are they measured?", and "How is it possible to implement an open-minded culture that couples less super-vision with direct and transparent feedback?" Understanding this, we wanted to know which aspects companies consider as key success factors or as challenges for Agile Organizations. By their nature, enterprise agile practices foster a culture of teamwork, honesty, and transparency. Everyone collaborates closely, fostering a spirit of cooperation and shared trust. Retrospectives and other forms of actively engaging improvement opportunities mean that everyone has a real chance to make things better. No lonely, ignored suggestion boxes needed. Enterprise agile aligns the entire organization through a set of lightweight, shared processes and practices. By doing that, the organization as a whole can adapt quickly as the market changes or as new ideas come to the fore. By harnessing the entire organization to focus effectively on the few top priorities, with progress visible to all through objective, meaningful metrics, the organization is able to rapidly create and deliver value and then move on to the next-highest-priority items.

Enterprise Agility Challenges (IFS, 2019):

- Preparing for the Unknown: It's about preparing for an unknown, unpredictable future that is filled with uncertainty. Worryingly, 70 percent of executives who responded to a recent Accenture survey expressed dissatisfaction at their inability to predict future performance in the new normal of permanent market volatility and the uncertainty it creates.

- Realizing Value from Investments, Rapidly: Any investment, whether in real estate, resources, personnel or technology not only has to be justified at board level, but must demonstrate a return more quickly than ever. If the days of long implementation cycles are over, the days of stringent measurement of total cost of ownership, combined with quick return on investment have arrived.

- Converting Skills and Knowledge: A key challenge faced by businesses in complex, technical industries is how to convert skills, knowledge and ideas from individuals, as human capital into structural capital that can benefit the whole business. In highly technical and geographically distributed industries, the knowledge of specialist teams and employees can be an organization's greatest asset and therefore should be managed accordingly. Information needs to be diffused and shared as much as possible in order to create effective knowledge transfer to new employees and ensure vital information stays within the organization.

- Transforming Customer and Supplier Relations: The growing digitization of everything has not only fundamentally changed the way businesses operate, but it has changed the way consumers think, behave and engage with organizations. The power of the internet combined with the onslaught of mobile devices, giving consumers access to information 24/7 means organizations must adopt a digital transformation strategy to remain competitive. Project - and asset-based businesses – such as energy and utilities, manufacturing, construction and defense -are under pressure to transform how they serve and interact with customers, suppliers and partners.

- Changing Working Culture, Processes and Practices: As well as adaptable technology, adaptable people and culture within an organization are also essential to agile businesses and helping organizations work towards a strategic vision that is itself constantly changing. Driving this change is a new generation of worker. According to Forbes, "Millennials are going to make major shifts in corporations over the next decade and most people aren't ready for the amount of change that's coming. By 2025, Millennials will account for 75 percent of the global workforce." What this means for organizations is that in order to capitalize on these changes to create business advantages, they must have the systems, processes and culture in place to facilitate transformation, as and when it occurs.

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Development of Research and Innovation Potential Evaluation Tool for Commercialisation

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Abstract: Research commercialisation is important for national development in many ways, including the improvement of quality of life and economic and social development. Research commercialisation is not an easy task because there are several factors and problems, such as possibilities of industrial production, business endeavours, marketing size, technology at the level that can be developed industrially and basic research focusing on principles or theories, which can be too difficult for industrial implementation. These factors may not be considered prior to any push of commercialisation; therefore, it is not successful and causes the loss of time and budget adherence. The aim of this research study was to develop a tool for research and innovation potential for commercialisation evaluation. It is a qualitative research study, and in-depth interviews, focus groups and expert panels were used for five case studies. The research findings showed that the evaluating tool consists of four dimensions: 1) business strength, 2) market attractiveness, 3) research and innovation readiness levels and 4) readiness of research owner.

Keywords: research commercialisation, innovation, technology life cycle, evaluation tool, research and innovation readiness levels

1. Introduction

The previous Thai government launched policies aimed at national reform, such as a basic economic framework adjustment, tourism promotion, export and investment capacity enhancement and encouragement for start-up entrepreneurship. The university is a significant source of research and innovation knowledge for the social and economic development of the nation; therefore, the university plays important roles in enhancing national development. In fact, most new knowledge and information have not been publicized or transferred publicly for commercialisation yet. Consequently, Thailand devotes considerable efforts to encouraging research for commercialisation, as demonstrated by the National Innovative Research Driving and Reform Plan and the 20-Year National Research Strategic Framework (2017-2036), emphasising research and innovations that are important mechanisms to propel national strategies by establishing a research and innovation integration plan to create the continuity of research and innovation works and commercialisation in the sectors of production, services, businesses or even applications in government organisations at all levels, including ministries, departments and provinces (Ministry of Science and Technology 2018).

Nevertheless, commercialisation is not an easy task due to several problems, such as possibilities of industrial production, businesses, marketing size, technology at the level that can be developed industrially and basic research focusing on principles or theories, which cause difficulties in industrial applications. Moreover, commercialisation consumes time and requires cooperation from many sectors, including researchers who are the owners of research works, intellectual property experts and entrepreneurs (Conceicao, Sousa & Fontes, 2017). These issues have not been elaborated for commercialisation encouragement, which has resulted in unsuccessful commercialisation in which there is a loss of time and budget adherence. At present, there are no research potential evaluation tools or criteria for commercialisation that can investigate all dimensions, including the business dimension, marketing dimension and readiness of technology and innovation (Vandaele & Decouttere 2013; Sohn & Moon 2003). Therefore, the aims of this research study were to investigate and to develop tools for evaluating research and innovation potential for commercialisation to create a fundamental tool for research potential evaluation for basic consideration to confirm readiness before beginning any commercialisation project.

2. Theoretical foundation

For this research study, theories and concepts of the commercialisation process, an analysis of business capacity and an analysis of technology readiness levels were applied as basic concepts for research potential development and an evaluation tool for commercialisation.

2.1 Commercialisation process

The commercialisation process is a concept used to solve problems of research applications and utilisation that hamper opportunities to develop new innovations. The process leads to innovation development both in the forms of products and services, and it is usually related to intellectual property (IP) (Pellikka & Malinen 2014; Conceicao, Fontes & Calapez 2012; Novelli & Rao 2007). Many researchers have defined the commercialisation process differently based on context and use. For example, Carayannis, Cherepovitsyn & Ilinova (2016) stated that the commercialisation process consists of research and development, invention disclosure, technology assessment, patent application, IP protection, marketing and business proposal and technology commercialisation (licensing /start-up company). While Khademi (2013) studied the commercialisation process of a university and found that the process consists of scientific discovery, invention disclosure, evaluation of invention for patenting, patenting, marketing of technology to firms, negotiation of licenses and licenses for firms. However, Gbadegeshin (2019) claimed that there are four steps of commercialising: new discovery, assessment of the new discovery, protection of the new discovery, prototyping development and testing and selling IP and licensing IP. In conclusion, the commercialisation process requires knowledge and expertise of science/technology/innovation, intellectual property management, law, marketing and managerial administration. Consequently, it is necessary for experts from all fields to work collaboratively to bring translational research to the real market. The research findings indicated that the commercialisation process is a process of idea generation, IP protection, prototyping and commercialisation.

2.2 Analysis of business capacity of products

There is considerable research and several tools that are used for the study and analysis of the business capacity of the products, and a well-known tool is the GE-McKinsey matrix (McKinsey & Company 2008; David 2009). The GE-McKinsey matrix is a tool for making decisions related to business investments to determine the worth of an investment. The analysis focused on two dimensions: 1) industrial attractiveness, such as marketing growth rate, previous years' profits and competitive violence, technological regulation, environmental effects, social issues, politics and law, human rights, etc., and 2) business strength by analysing several factors, such as market share, received profit, pricing competitive capacity and quality of products, brand reputation, distribution network, effectiveness of marketing support, production ability, technological ability, effectiveness of production, budget per unit, raw materials for production, effectiveness of research and development, administrators' ability, etc. The evaluation criteria for each dimension are shown in Table 1.

Table 1: Consideration criteria of each dimension of the GE-McKinsey matrix

Industrial Attractiveness	Business Strength
Market size	Product strength
Market growth rate	Brand strength
Market profitability	Market share
Pricing trend	Growth of market share
Competitive condition/competitors	Loyalty of customers
Industrial investment risk	Pricing structure comparing to competitors
Barriers for new entrepreneurs	Profitability comparing to competitors
Originality of products/familiarity to products	Production and distribution capacity
Fluctuation of demands	Technology and innovation
Marketing ratio	Quality
Distribution framework	Access to budget resources and joint venture
Technology development	Strength management
Market growth rate	Brand strength

Source: McKinsey & Company (2008)

2.3 Technology readiness levels (TRL)

The readiness level of industrial technology was developed to be used as a tool for the readiness evaluation of research, technology or innovation in each context of use. NASA first began development in 1970, and it was widely applied for technological and product development. Technology readiness is divided into nine levels: 1) basic principles observed and reported – considering basic scientific principles by reviewing related literature and research; 2) literature review/prior art, technology concept and/or application formulated – basic analysis to confirm the technological principles and possibilities of application without improvement or analysis

supporting hypotheses; 3) analytical and experimental critical function and/or characteristic proof-of concept – getting analysis results proving the possibilities of the concept and the proof of the concept based on analyses or experiments; 4) component and/or breadboard validation in a laboratory environment – collaboration of all parts and model demonstrations in a laboratory to determine whether it can solve specific problem, including presenting views towards models presenting expected capability; 5) component and/or breadboard validation in a relevant environment – main components are combined by supportive components to test and to demonstrate technology in a virtual environment, 6) system/sub-system model or prototype demonstration in an operational environment – perfect model tested and demonstrated in the virtual environment leading to the success or failure of the project; 7) system prototype demonstration in an operational environment – the last step of development through a virtual demonstration that cannot control related factors for success or failure in a systematic work with the actual system completed and 'flight qualified' through test and demonstration – ready-made model for sending the system to customers/users; and 9) actual system flight proven through successful mission operations – technology is actually used, and there are continuous following-up activities in an appropriate time to determine faults so that they can be solved (National Academies of Science, Engineering and Medicine 2016).

The technology or innovation at level 6 is ready for commercialisation (Straub 2015). The TRL is a tool that determines the readiness of technology from a research and development model to development for actual use in the form of a linear approach, and it is a single technological development applied and integrated into other technologies in more modern technology firms with more complicated products. Nonetheless, the TRL has been widely defined and applied in several contexts. The European Association of Research and Technology Organisations (2014) applied TRL concepts to measure the maturity cluster at six levels, invention, concept validation, prototyping and incubation, pilot production and demonstration, initial market introduction and market expansion, while the European Commission (2013) applied the TRL for a technology readiness evaluation that was divided into five levels, principle understood in the laboratory, prototype proof and concept, realistic demonstration, limited scale production and mass scale exploitation. Moreover, the TRL is applied to the product development process in an R & D organisation context, and the European Union's Horizon 2020 (2019) applied the TRL to measure technology readiness for production and services divided into ten levels: level 0 – idea, level 1 - basic research, level 2 – technology formulation, level 3 – need validation, level 4 – small scale prototype, level 5 – large scale prototype, level 6 – prototype system, level 7 – demonstration system, level 8 – first of a kind commercial system and level 9 - full commercial application. In addition, Ekins and Salmons (2010) stated that the application of TRL in a research context can be divided into four levels: Basic research (TRL1-3), Development (TRL3-5), Demonstration (TRL 6- 7) and Early deployment (TRL8-9).

2.4 Theoretical synthesis

For this research, TRL concepts and the GE-McKinsey matrix were applied in the university context to develop a research potential evaluation tool for commercialisation. The analysis and synthesis of concepts, theories and related research revealed that there are three dimensions of research potential for commercialisation evaluation criteria: business strength, market attractiveness and research and innovation readiness levels, as shown in figure 1.
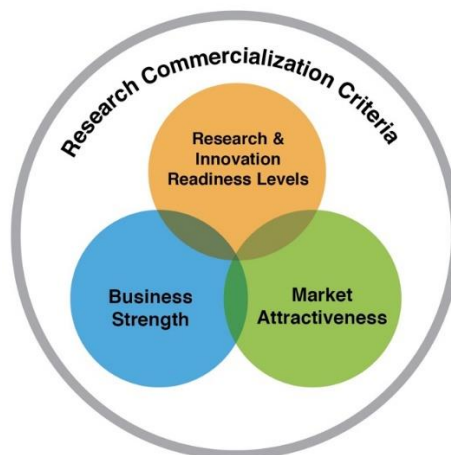
Figure 1: Criteria for the evaluation of potential research for commercialisation

3. Research methodology

This research study is qualitative in nature and included multi-case studies. The research samples were taken from research of a Thai research university. There were three main research procedures: literature review, tool validation and data analysis, as detailed below.

- Step 1: Literature Review: The researchers reviewed related literature and research to obtain an understanding of studied variables and then analysed and synthesised them to design a research and innovation potential for commercialisation evaluation tool. After that, the tool was validated by three experts, and then case studies were selected using the criteria obtained via an expert panel process.

- Step 2: Tool Validation: The researchers validated the tool twice through a pilot test and case studies through in-depth interviews and then adjusted it based on the interview results and validated it again with two case studies through in-depth interviews.

- Step 3: Data Analysis: The researchers drew conclusions using the processes of analysis, synthesis and content analysis.

The researchers selected the case studies from a research report of Kasetsart University and called for a meeting. The attendants were university administrators in charge of research to commercialisation support and selected 119 primary research studies in the Innovation Hub of the university. For this qualitative study, the samples were selected using the criteria of Miles and Huberman (1994), conforming to the research objectives, with sufficient in-depth information to explain phenomena, to allow for a clear conclusion, to ensure validity and reliability, to adhere to research ethics and to have an appropriate sampling plan. The case studies were based on the research and innovations of lecturers at Kasetsart University, and 4-40 samples were selected based on the criteria to serve the research objectives and data collection methods (Holloway & Wheeler 1996; Miles & Huberman 1994). The case study selection criteria are as follows:

- 1) Level of research and innovation: from basic research and applied research. Applied research was selected for this research study.

- 2) TRL is divided into nine levels: TRL 0 Idea, TRL 1 Basic research, TRL 2 Technology formulation, TRL 3 Applied research, TRL 4 Small scale prototype, TRL 5 Large scale prototype, TRL 6 Prototype system, TRL 7 Demonstration system, TRL 8 First of a kind commercial system and TRL 9 Full commercialisation application.

- The samples of this research study were at least TRL 5.

- 3) Type of research and innovation: covering five research groups categorised by Kasetsart University, including fresh food and healthy food, agriculture, health and beauty, machine and invention and information technology and application.

- 4) Willingness to provide data: research samples were willing to provide data.
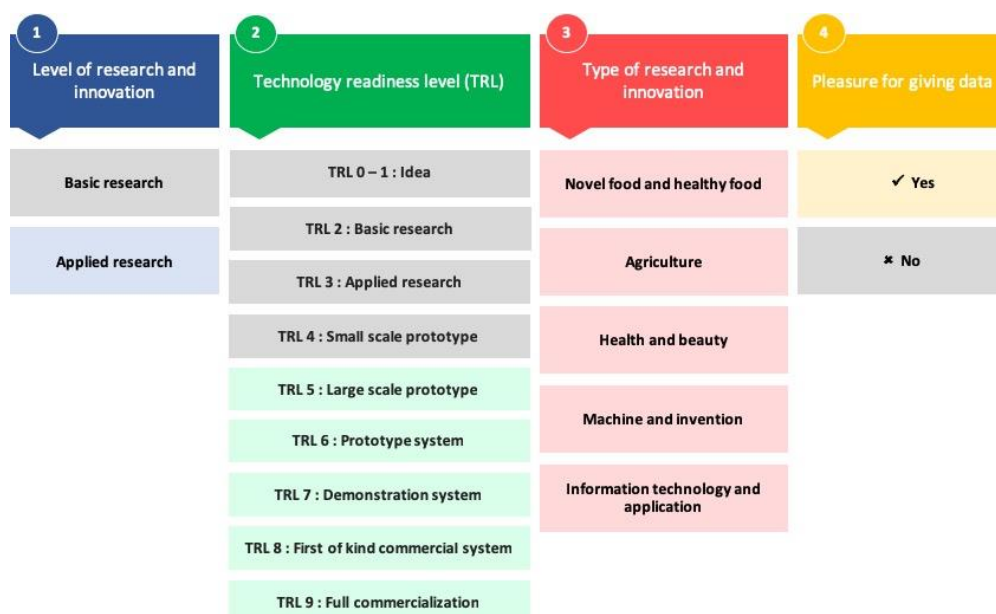
Figure 2: Case study selection criteria

The researcher used four selection criteria determined by three experts via an expert panel process. The experts have expertise in intellectual property management, innovation management and commercialisation. Five case studies were selected, as shown in figure 3.

Figure 3: Selected case studies

▪ Step 4: Conclusion: The researcher analysed and synthesised collected data and designed and created the research and innovation potential for commercialisation evaluation tool.

4. Research results

4.1 Development of research potential evaluation tool for commercialisation

Based on the literature review, the researcher determined the criteria for the research and innovation for commercialisation evaluation tool and then continued the validation process via three experts through an expert panel process. The experts consisted of an expert in research innovation for commercialisation with 20 years of work experience, an expert in intellectual property management with ten years of work experience and an expert in marketing and business. The experts then tested the validity of the research instruments with three case studies and adjusted the instruments with two case studies to obtain empirical data though in-depth interviews.

Table 2: Details of case studies

Case Study	Type of Research	Characteristics of Case Studies
Case Study 1	Novel food and Healthy Food	Diabetes and free radical control sheets that were produced by natural solution, which can be eaten to slow down glucose absorbing into the blood stream and to increase blood sugar.
Case Study 2	Agriculture	Vaccine to prevent new types of viruses in Nile Tilapia Fish and Red Tilapia Fish. It is a prototype of both a live attenuated and a killed vaccine. It was produced from a virus grown in the lab. It is effective and safe for immunity activation to increase survival rate, decrease diseases from a new virus, reduce imported medicine and unnecessary chemicals, reduce expenses for fish farm investments and decrease drug action resistance with more safety for consumers and the environment.
Case Study 3	Health and Beauty	Products developed by Gamma-aminobutyric acid (GABA) from rice berry. These are outstanding in terms of helping sleep, decreasing facial wrinkles and enhancing brain functions. This includes the extracts from Hyaluronic acid that can enrich the skin and restrain Tyrosinase, which helps produce melanin, causing clear skin.
Case Study 4	Mechanic and Invention	Personal rice mill machine serving a variety of rice types in Thailand. This machine can rub 300-gram rice per each time, which provides 150-gram rice for consumption. It uses 220-volt 10 Amp 1 Phase, so the electricity motor is 300 w size with 10-kilogram weight. It is movable, clean and safe.
Case Study 5	Information Technology and Application	Statistic Data Collection Application. This is for data collection from people in both the government and private sectors. The data include

Case Study	Type of Research	Characteristics of Case Studies
		statistical data related to finance, investment and production of agricultural products to estimate its quantity so that it helps calculate capital and prevents oversupply. This problem has not been solved because there is no connection of the data analysis between organisations. This is a significant rationale for completing a research project to collect data from agriculturalists from all over the country and to link the data to commerce and services of outstanding agriculturists.

The findings of the in-depth interviews from the five case studies showed that the research and innovation potential evaluation criteria for commercialisation include more than three dimensions. Factors related to readiness of time, determination and even investments are also significant and likely affect the success or failure of commercialisation. The researchers therefore adjusted the fourth dimension to become readiness of researchers as a criterion. It can then be concluded that the criteria for evaluating research potential for commercialisation include four dimensions: 1) business strength, 2) market attractiveness, 3) research and innovation readiness levels and 4) readiness of research owners/researchers, which are detailed as follows.

1. Business Strength
    1.1 Clarity of resources and strength of products
        1.1.1 Ability to respond to the pain point (actual problems and needs) of target groups
        1.1.2 Clearly have different functions/characteristics from the old products
        1.1.3 Developed by the use of new technology/specific knowledge that is difficult to imitate
    1.2 Target group
        1.2.1 Clarity of target group (age, gender, etc.)
        1.2.2 Sufficient quantity of target group
    1.3 Distribution channels to reach the target group
        1.3.1 Clarity of conceptualisation for determining the distribution channels
        1.3.2 Coverage distribution to support product access of the target group
    1.4 Public relations (PR)
        1.4.1 Clarity of conceptualisation for PR to reach the target group
        1.4.2 Clarity of key message communicating to serve the target group's needs
        1.4.3 Appropriateness of communication channels to the target group (online or offline, etc.)
    1.5 Production duration/power to serve market needs
        1.5.1 Appropriate production duration compared to other products with similar conditions
        1.5.2 Sufficient raw materials/machines for production if there is a scale-up production
2. Market Attractiveness
    2.1 Market size and growth trend
        2.1.1 Large market and sufficient number of buyers
        2.1.2 Trends of purchasing needs that continuously increase
    2.2 Conditions of industrial competition
        2.2.1 The industrial completion conditions that serve the generation of new entrepreneurs (unclear new competitors, not many competitors, etc.)
        2.2.2 Government polity serving the generation of new entrepreneurs
        2.2.3 Technological progress of competitors in the industry
    2.3 Familiarity to products/customers
        2.3.1 Similar products
        2.3.2 Customers previously used similar products
    2.4 Supplier/raw material resources
        2.4.1 Sufficient quantity and size of suppliers and easy access
        2.4.2 Quantity of raw materials/sufficient raw materials and easy access
    2.5 Interest from market and investors
        2.5.1 Potential products needed by the market
        2.5.1 Good profit
3. Research and innovation readiness levels
    3.1 Level 1: Basic research
    3.2 Level 2: Solution exploration
    3.3 Level 3: Prototype development and product testing

3.4 Level 4: Limited scale production

3.5 Level 5: Market launch and commercialisation

4. Readiness of the researchers (product developer)

4.1 Determination of the researcher to commercialise

4.1.1 Faith/believe in the outcomes of his/her research product that will widely benefit the public at large

4.1.2 High determination to publicise research product and push the responsible agencies to implement it widely

4.2 Timely readiness

4.2.1 Timely readiness in attending meetings and exhibitions and pushing its implementation at large as well as business matching

4.2.2 Ready at all times during its incubation (such as meeting with entrepreneurs, development of the prototype from the lab to the market, etc.)

4.3 Investment readiness

4.3.1 Positive vision in jointly investing with private entrepreneurs

4.3.2 Basic knowledge of the business and ready to accept the risk that may arise after the investment

In addition, the authors developed a template representing the assessment results for the ease of interpretation and further usage, as shown in figure 5.

Figure 4: Commercialisation readiness

5. Conclusions

Previous research has shown that the success of the commercialisation process more or less depends upon the level of readiness of technology; however, this research study has also integrated the importance of business readiness. The business readiness factors both from the macro and micro perspectives were also integrated into the research results. At the macro level, the market attractiveness is determined. While at the micro level, the business strength is determined. This comprehensive approach creates a balance between technology push and market pull, which is an important factor that leads to the success of the commercialisation process. In addition, during the validation process of the tools used in this research, it was found that the readiness factor of this research, especially the readiness of investment, is another success factor of the commercialisation process. These findings can be clearly seen in the context of developing countries, such as Thailand, where the mechanism for intellectual property management is not ideal and the share of the benefit to the researcher is not at all clear.

Researchers do not receive a sufficient share of financial benefits, and many researchers do not have positive attitudes toward private entrepreneurs. Moreover, researchers have a lack of basic knowledge of business management and a lack of knowledge in choosing which commercialisation models will be favourable. They are also unable to negotiate in business deals. Due to the lack of ability to negotiate commercialisation in any form, licencing cannot be done, for example. Thus, many Thai researchers are focusing on research for new knowledge and publications to advance academic positions and promotions rather than for the advancement of commercialisation. Therefore, the involved organisations, especially universities, should promote the readiness of investment for researchers to increase the rate of commercialisation within each university accordingly.

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The Digitalization Crisis in the Knowledge Economy

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Abstract: The purpose of this study is to explore the phenomenon of a "digitalization crisis" in economic development and to identify its impact on and implications for the firm-level innovation. The quest for the digitalization of society is predicated on the assumption that collection and processing of an ever-increasing amount of data will provide a new boundless source for the extraction of knowledge. Throughout the scientific and technological progress, however, data has grown at a faster pace than the intellectual and computational capacity of society to process them. Digitalization is no exception. Materials and research methods include exploring the IT sector as a resource for developing innovations in a digitalized society. The factual basis of the study comprises analytical reports of consulting IT companies (IDC, McKinsey), results of studies of experience to date of IT adoption in business settings, and official statistical data. The study considers approaches to evaluation of data access efficiency and data processing impact on economic decision making. The results of this study show that there is a crisis that presents itself in the inability of IT infrastructure to provide companies with effective access to digital data in the course of their innovation. At the same time, the volume of digital data is growing exponentially due to the spread of the Internet of Things and the increasing frequency of interactions between citizens and digital services and platforms. The crisis prevents businesses from extracting knowledge from the data flow to develop innovations. Overcoming the digitalization crisis depends on many factors in a company's external and internal environments. It is within the competence of the company to improve its organizational structure, business model and human capacity. The role of external environment is to create favorable conditions for companies to access innovation resources, including data, competences and technologies.

Keywords: knowledge economy, innovation, digitalization, information technology, crisis

1. Introduction

The digitalization of society and the economy opens up new sources for the extraction of knowledge and lays the foundation for digital innovation by companies. These opportunities emerge due to the amount of digital data and the advances of information technology (IT) accumulated by society. IT has created momentum for innovation in the post-industrial phase of society by driving improvements in data-related types of economic activities, ensuring an increase in productivity and manufacturing efficiency, and, above all, providing for the growth of the economy. At present, IT-related dimension of innovation is still relevant to many businesses around the world. In developed countries, the widespread adoption of IT and the presence of an advanced IT infrastructure provide the basis for the transition of the economy to a new phase of IT integration, which is digitalization.

The digitalization of society is based on the IT infrastructure that is available for any company to use to develop innovation or collect and process digital data. The IT infrastructure includes enterprise-level and personal computing devices, including mobile devices that provide citizens with instant access to a variety of digital services. The IT infrastructure provides these devices along with lines of communication between them and with data centers.

The rate of data accumulation is soaring as IT becomes increasingly involved in virtually all types of economic and societal activities. Large-volume data arrays are becoming a new resource for the knowledge economy.

Many countries have chosen digitalization as a vector of their social and economic development. However, the desire to digitize society is met with many skeptical warnings from experts in different fields. Information security specialists foresee the impending digital colonization of developing countries, which poses new threats to information and cyber safety (Kasperskaya, 2018). The dependence of businesses on foreign IT and software developers can become a key quandary (Bhattacharya, 2010). Russian researchers point to the widening gap in scientific and technological advances between developed and developing countries that cannot be bridged through digitalization (Malinetsky, 2018; Veduta and Dzhakubova, 2017). At a time when a country acquires all the necessary technologies on the international market, the prospect of domestic development is greatly reduced.

While experts indicate the emergence of new digitalization-related threats to information security and the appearance of a digital barrier for scientific, technological and social and economic growth, none of them calls to abandon the digital path to development. There is a general consensus among experts and scholars that digitalization is a complex phenomenon that requires the development of a methodological approach to extracting competitive advantages for the education, science and economy of a country as a whole. Researchers are continuously turning to the study of the crisis of the economy. It has been noted that the cyclical nature of scientific and technological progress, on the one hand, serves as an impetus for innovation and, on the other hand, as the cause for a new crisis. Today, there is a change in the way IT is used in society and the economy: from informatization to digitalization (Owen, 2015).

The aim of this study is to explore the phenomenon of the digitalization crisis and its implications for the firm-level innovation. The digitalization of society must lead to the emergence of innovative goods and services.

2. Digital data growth

The most notable trend in the development of the information society is the increase in the amount of information accumulated. Derek Price (1963), a British scientist, formulated in the mid-20th century the law of exponential increase in the amount of information accumulated, which states that the more effective the transmission of information is, the more intensively it is accumulated. However, the increase in the volume of information at that time was due to an increase in the number of professionals involved in the creation and dissemination of information.

Today's volumes of information, which are commonly referred to as "digital data," are generated by an extensive IT infrastructure. The term "digital data" allows to focus on the digital form of information that is easier for automated processing. The term "information" is generic for the concepts of data, knowledge and includes any materials "regardless of the form of their presentation." The digital form of transmission and accumulation of information is currently almost universal.

The digitalization of society is the basis for accelerating the rate of digital data accumulation. In previous phases of IT use, the volume of data in the economy and society was also increasing, but at a much slower pace due to the high cost of collecting structured data in that environment.

Figure 1 reflects the phases of IT use in the economy, the increment rate of digital data, and the basic IT to work with it. The automation phase is characterized by a focus on addressing the problems of transmission and processing of digital data. Since the informatization phase, as the volume of information in a digital form has been increasing by many times, new information technologies are emerging that support working with a variety of data formats in the economy: corporate information systems, decision support systems, etc.
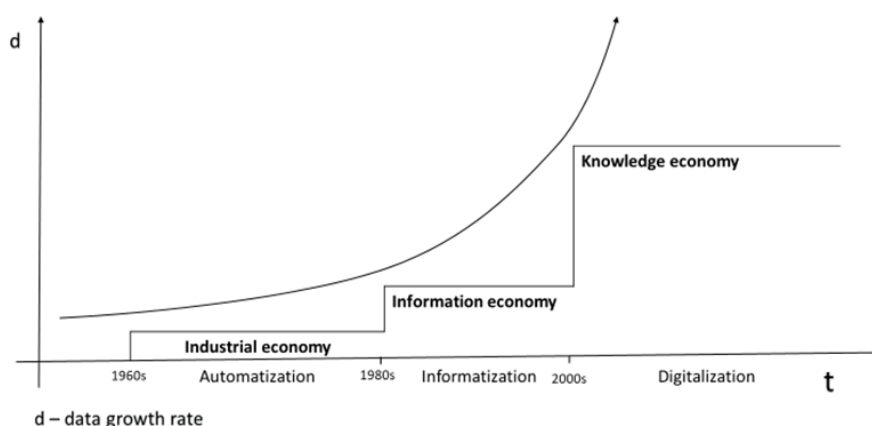
Figure 1: Data growth rate in the data economy

As information technology spreads and over half of the world's population is involved in the World Wide Web (more than four billion people are Internet users), the data accumulation rate is increasing due to the increasing number of interactions people have with digital platforms (social media, digital facilities for ordering goods and

services, etc.). According to the U.S. research company IDC, each Internet user on average had more than 500 contacts with digital platforms per day in 2018. By 2025, the number of such per capita interactions is projected to be about 5,000, which is approximately one contact every 18 seconds (IDC, 2018). This interaction with technologies can occur unnoticed by humans due to the spread of the Internet of Things and the increase in the number of wearable and routinely used devices such as smartphones, smartwatches, fitness bracelets and others.

Digital data are collected and transmitted to data centers by computing devices that are connected to the Internet. This increases the number of computing devices people use by their own choice and will. The Internet of Things devices used by government agencies for monitoring, traffic control and security purposes are means of collecting digital data. Businesses in their economic activities also use the Internet of Things or industrial Internet.

A hallmark of the Internet of Things is the integration of devices into the network to collect and transmit data about the state of the device itself, the conditions of its use and its malfunctions without human involvement (Nefedov et al, 2018; Ruposov et al, 2018). The Internet of Things allows manufacturers to learn how customers make use of their products and plan after-sales services accordingly; for manufacturing process, it helps reduce downtime of the equipment, better manage inventory, improve forecast accuracy, optimize the cost of quality management, etc (Pavlekovskaya et al, 2018; Dneprovskaya et al, 2018).

The number of devices interconnected by the Internet of Things amounted to about 20 billion in 2016, only to become 30 billion by 2020 and surpass 80 billion by 2025.

The quality and speed of data processing will depend not so much on the devices themselves, but on the network infrastructure by which digital data are transmitted. In the context of the digital economy development, the quality of networks is of paramount importance for the IT infrastructure.

IDC's experts (2018) estimated the amount of data accumulated in 2006 at 161 exabytes ($161 \cdot 10^{18}$ bytes), the company's forecast for 2025 was 175 zettabytes ($175 \cdot 10^{21}$ bytes). In less than 20 years, the amount of digital data can increase by 1,000 times. The data flow increases with respect to the following:

- rate of accumulation
- amount of data
- diversity in data presentation formats
- number of data sources and data collection tools.

3. Access of digital data

Researchers of the 20th century saw the danger of the information crisis in the fact that much of the information flow was not subjected to reasoning, analysis and human processing, which could lead to the loss of knowledge contained in the part of the information flow that was ignored. Stanisław Lem (1964) said that the increasing amount of information "could slow down the growth of science if we do not perform the same kind of upheaval in the intellectual sphere as we have done in the field of physical labor over the last two centuries".

Information technology has been seen by many scientists as a tool to overcome the "information crisis" by spreading the achievements of the IT revolution, which include personal computers and the World Wide Web (Aiello, 2018). Improvement of the IT has been aimed, in particular, at ensuring that the increasing amount of information will be processed. However, the volume of information, including digital data, grew much faster than IT capacity to process it. The accumulation of data is proceeding at a faster pace than scientific and technological progress (Afanasev et al, 2018). Nowadays, every contemporary person at every point in life ignores, whether knowingly or not, a significant part of the information available to them.

Thus, we will term the inability of today's IT infrastructure to provide businesses with effective access to the accumulated volumes of digital data as the digitalization crisis.

The main manifestation of the crisis is the diminishing efficiency of access to data in the context of increasing data flow (Figure 2). The efficiency of access to data is usually measured by the criteria of completeness and accuracy of the data obtained.
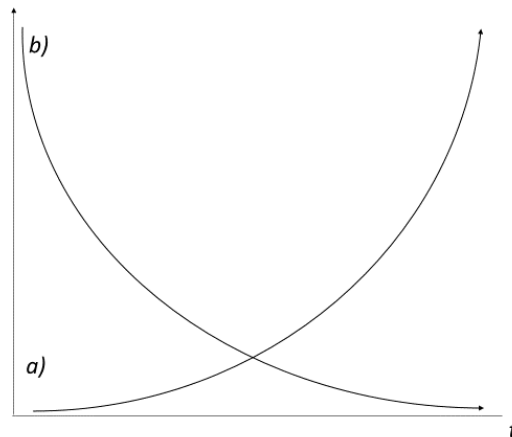
Figure 2: Digitalization crisis: a) rate of increase in the amount of available information, b) efficiency of working with information

In the context of digitalization, for the purpose of solving information problems, the set of accumulated data will tend to infinity. At the same time, due to the imperfection of the data processing tools, the proportion of data that is processed for or involved in problem solving will be continuously reduced (Van den Bosh et al, 2016).

The conclusions of theorists who projected the onset of the digital crisis have been vindicated by the results of the modern-day research into digitalization and the IT industry. As indicated in the IDC (2018) report, only 1% of digital data were processed in one way or another in 2018. Another expert's finding that the data security is only maintained for 20% of the acquired data should be a warning. Thus, 99% of digital data are left unused and unprocessed, with 80% unprotected.

The use of digital data as an economic resource requires the company to meet a number of economic challenges in addition to the technical challenge of accessing them. The economic tasks related to the use of digital data include:

- calculating the value and cost of digital data for the company
- determining property and other digital rights
- ensuring the security and confidentiality of the data in accordance with legal requirements.

4. The impact of the digitalization crisis on businesses

Reducing the efficiency of work with information arrays, in general, leads modern-day companies to losses and lost profits. Results of a study conducted by the IDC research company among the U.S. businesses show that employees involved in intellectual activities (knowledge workers) spend 15% to 35% of their working time on accessing data (Mankins, 2016). In doing so, they manage to obtain the information they need in less than half of the cases, which necessitates further collection of missing data.

Lack of access to data does not mean the lack of underlying data in the information space of the economy. Access failures are frequently due to the barrier of the digitalization crisis, or the lack of relevant competence or access technology in the company. Consequently, the company comes to the need to duplicate the collection of digital data, which is usually much more expensive than purchasing application-ready datasets from their providers.

Feldman (2004) estimates that companies lose at least U.S. $6 million annually on data access alone and $12 million on duplication of information they already possess.

Impediments to digital data access are caused by external factors, such as rapid growth in data volume, lack of appropriate data structuring, inadequate processing technologies, but also by internal factors, such as the adoption of IT by the company while lacking competences for its application.

The internal factors undoubtedly affect the company's business organization, including the efficiency of IT application. The surprising study results by Bain&Company published in the Harvard Business Review indicate that adoption of information technology by a company can have a negative impact on productivity (Mankins, 2016). These findings are based on the fact that the introduction of IT, mainly electronic means of communication, to the business management processes leads to a sharp increase in the number of messages and contacts employees' process to perform their duties.

According to the study results, a redistribution of working time occurs in favor of information processing tasks. For example, a mid-level manager spends 45% of working time on meetings and 23% on processing electronic correspondence. An increase in the number of clearances required by a decision-making process as compared to the end of the 20th century causes lengthening of the IT project by 30%, the hiring of employees by 50%, and the conclusion of contracts with new customers by 25%.

Thus, there is a paradoxical situation when technologies that the current external environment requires companies to adopt, lead the same companies to negative outcomes and losses. Available research and educational materials provide extensive evidence of the low share of successful IT projects and the high risks associated with their implementation (The Standish Group International, 2014; Mathiassen and Tuunanen, 2011). According to some estimates, only 16% of IT projects can be considered successful as they are implemented on time, within the allocated budget and with the desired results achieved (Vasiliev et al, 2015). On the other hand, most IT projects show signs of not being a success: behind schedule, cost overrun, absence of desired impact.

Internal factors that affect the outcome of the IT implementation and digital data applications comprise the company's own resources: organizational, human, intellectual, material, financial and manufacturing.

Caused by the features of both external and internal environments, a significant disparity emerges in the level of success in adoption and subsequent application of information technology by businesses. The disproportionality of the innovation environment lies in the discrepancy between the development of its elements and the needs of businesses, citizens, organizations and public administrations (Dneprovskaya et al, 2018). As a result, the introduction of similar IT projects in different external environments, such as exist in different countries, produces different economic outcomes. The slowdown in the economic impact of IT adoption is further exacerbated by the global digital divide.

A pattern appears that describes the relationship between the economic success of IT implementation and access to other types of innovation resources. Information technology, digital data and competencies therein are the company's key innovation resources in the digital economy (Figure 3).

t` the period of deficit of one or several types of innovation resources
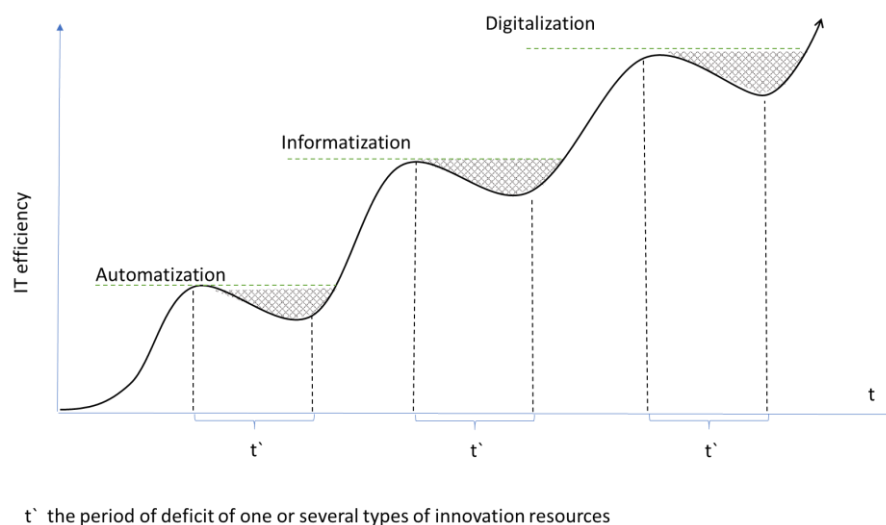
Figure 3: "IT trap for enterprise"

As a consequence of a shortage of one or more types of innovation resources while adopting information technology, the company falls into the IT trap. The IT-trapped business incurs rising IT costs while the economic impact can still be negative.

The application of IT and digital data in a company opens up new opportunities for developing a variety of innovations ranging from a digital business model to a digital service. Without sufficient competences, however, companies tend to apply information technology to support outdated business models and habitual organization of business processes. For such companies, adoption of information technology increases financial and labor costs of IT and digital data. A study of this situation was presented in the article considered above.

Statistical investigation into the use of digital technologies in companies confirms the finding that the introduction of IT is not by itself sufficient for the company to start creating digital innovations (Minashkin and Prokhorov, 2018). Once IT is implemented, companies tend to maintain their habitual forms of manufacturing and distribution. Skeptical assessments of IT performance for innovation may be due to the fact that the above-mentioned information technologies were created in the 20th century to address the needs of automation and informatization.

Digitalization requires new information technologies that experts categorize as a concept of "digital technologies." To date, the achievements of the IT industry have greatly expanded the range of instruments of the knowledge economy. The development of digitalization is commonly associated with technologies: big data, neuro- and artificial intelligence, blockchain, quantum, industrial Internet, robotics and sensors, wireless communication, virtual and augmented realities.

Introducing new IT into businesses allows them to achieve new efficiency and meet new challenges (Dneprovskaya and Shevtsova, 2018). However, belated IT investments are not able to provide meaningful competitive advantages on the global market as they have already been used by other businesses.

A company tends to make up for the lack of resources it needs by acquiring them from the external environment as accumulation of the necessary data and development of relevant information technologies and competencies on its own is time-consuming and costly. At the same time, the rapid pace of scientific and technological progress and innovative upgrade of goods and services reduces the lifespan of competitive advantage due to a certain technology or competence. As exemplified by the development of digital services such as taxi and hotel booking, their provision in digital format quickly became the standard expectation of customers from providers of such services.

Studies show that countries that were the first to formulate public policy towards the information society have developed an enormous competitive advantage in the modern IT industry. The leading countries have become providers not only of technology, including software and hardware tools, but also of content, including business, scientific, mass media and entertainment information, for a long period of development of the information society.

Global information society does not create a level playing field for access to its benefits, as stated in the Okinawa Charter. To date, the international division in the area of information technology and derivative services has been clearly defined between the countries that are IT developers and suppliers and the IT consumer countries. To change its role, it would not suffice for a country to have an access potential to an array of information and knowledge as it will also need to know how to apply them to create global innovation.

5. Conclusion

Years of statistical observations show that scientific and technological progress is leading to an expansion of the information flow, which now includes digital data. The capacity to collect and store digital data has multiplied with extensive IT infrastructure. Every human being leaves numerous "digital footprints" in data centers while using their mobile devices, digital and local services. A network of devices connected to the Internet of Things is growing, where datasets are formed without human involvement. Consequently, the rate of digital data accumulation is on the rise, as well as the amount of data and variety of available formats for presenting information.

International and national digitalization initiatives see a dynamic array of digital data as an economic resource for an increase in productivity and economic efficiency and for economic growth in general. Cutting-edge smart information technologies provide for extraction of new knowledge from large volumes of data that were previously virtually inaccessible to human processing. Access to digital data enables businesses to innovate with respect to business models, company management, promotion of products and services in the digital space, and create technological innovations.

At the same time, today's economy and society are saturated with information technologies that used to be created to meet challenges of automation and informatization. These technologies do not fully enable the innovative potential of digital data to be harnessed. By IT industry expert estimates, 99% of digital data being collected are not subjected to subsequent analysis and processing.

In the IT infrastructure of the contemporary economy, a crisis clearly manifests itself that prevents businesses from harnessing IT and digital data to create innovation. Due to this crisis, the introduction of IT into businesses does not necessarily lead to the desired outcomes.

The digitalization crisis development is affected by factors that are both external and internal to businesses. External factors include non-compliance of IT with the requirements of the knowledge economy, the disproportionality of innovation environment, the dynamic structure of the markets for innovative goods and services that presents itself in the rapid obsolescence of technologies, methods and solutions. Globalization of the world economy and society implies that creation and enhancement of technologies cannot be a source of competitive advantages for a company or a country for a long time, and they need to be persistently upgraded.

Internal factors are the company's technologies and resource management methods: organizational, human, intellectual, social, financial, etc.

The hazard of the digitalization crisis for the development of a national or regional economy is that the respective digital market will be filled with goods and services supplied by foreign manufacturers, mostly IT giants.

Acknowledgements

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Investigating Intellectual Capital: The Role of Intellectual Property Rights Reform in Vietnam

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Abstract: In the era of knowledge - knowledge dominates value creation and capture, firms have taken intellectual capital as the most powerful competitive weapon. Accordingly, intellectual capital has been managed in attempts of maximizing firm value through comprehensive frameworks like Balance Scorecard, Skandia Navigator, or Dow Intellectual Asset Management Model. Moreover, there has been a growing number of empirical studies investigating the contribution of intellectual capital to firm value. These studies have been conducted on a wide range of industries across nations and virtually showed a significantly positive relationship. However, the extent to which the intellectual capital is protected against piracy is expected to account for variation in strength of the relationship. As a result, this study aims at determining the association between intellectual capital and firm value as well as the importance of intellectual property rights reform to that relation. The study collects data on non-financial firms listed on the Stock Exchange of Vietnam in the period from 2011 to 2019 and uses Fixed Effect Model and Random Effect Model for estimation. Intellectual capital is expected to have positive impact on the firm value. Moreover, intellectual property rights reform significantly differentiates the impact of intellectual capital on firm value. The findings suggest that intellectual capital – the main source of sustained competitive advantage – boost the firm value in an era of hyper-competition. More importantly, the role of reform in intellectual property rights in strengthening the relation between intellectual capital and firm value should be acknowledged by firms and governments. On the one hand, firms with high proportion of intellectual capital should select destinations where enforcement of intellectual property rights is well-implemented to protect them from intellectual property piracy and sustain their competitive advantage. On the other hand, local authorities should protect and enhance the enforcement of intellectual property rights on the purpose of improving business environment.

Keywords: intellectual capital, intellectual property rights reform, firm value, sustainable competitive advantage

1. Introduction

In the knowledge-based economy, intellectual capital (IC) attracts full attention of scholars and practitioners because it has justified the extremely wide gap between book and market values (Galbraith, 1969), has been the key to competitive advantage (CA) for firms, and has been the bedrock of the transformation of a nation into innovation-driven economies (Schwab, 2017). The dominant source of CA and firm value (FV) includes intangible assets – knowledge, intellectual property (IP), and experience (Conner and Prahalad, 1996). A great number of empirical studies consistently show IC, its elements – human capital and structural capital – and interactions between elements are related both to firm performance (FP) (Lin et al., 2014). More importantly, human capital (HC) is the leading element in term of its importance to FP. This study employs the VAIC model developed by Ante Pulic (1998, 2000) to measure IC as well as its elements.

IC is clearly affirmed to be a source of CA. However, whether or not sustainable competitive advantage (SCA) can be gained strongly relies on how effectively IC in general and intellectual property rights (IPR) are protected from being imitated. Consequently, IPR reform takes an important role in the relationship between IC and FV. Vietnam recently has witnessed government's great determination to take a leap from natural resource-driven to innovation-driven economy. To realize that dream requires a boost in IC, and a strong system of IPR. 2015 is considered as the turning point when the government made a long-term commitment on reforming administrative procedure and property rights, supporting start-up community and developing ecosystem on the purpose of becoming a start-up nation. Therefore, this is a good opportunity to analyze the contribution of IC to FV and to discover effect of IPR reform.

This study expands the comprehension of IC's impact on FV by including IPR reform as a moderator variable. To address research objectives, we estimate coefficients by using various regression models through two stages with secondary data on non-financial firms listed on Vietnam stock exchanges from 2011 to 2018.

2. Literature review

2.1 Intellectual capital

IC is defined as knowledge which is converted into value and is comprised of HC and structural capital (SC) according to the Skandia Value Scheme (Edvinsson and Sullivan, 1996; Petrash, 1996; Edvinsson, 1997) (see Figure 1). Particularly, knowledge which is owned by individuals is considered HC while the knowledge embedded in the structure, processes and culture of firms is defined as SC.
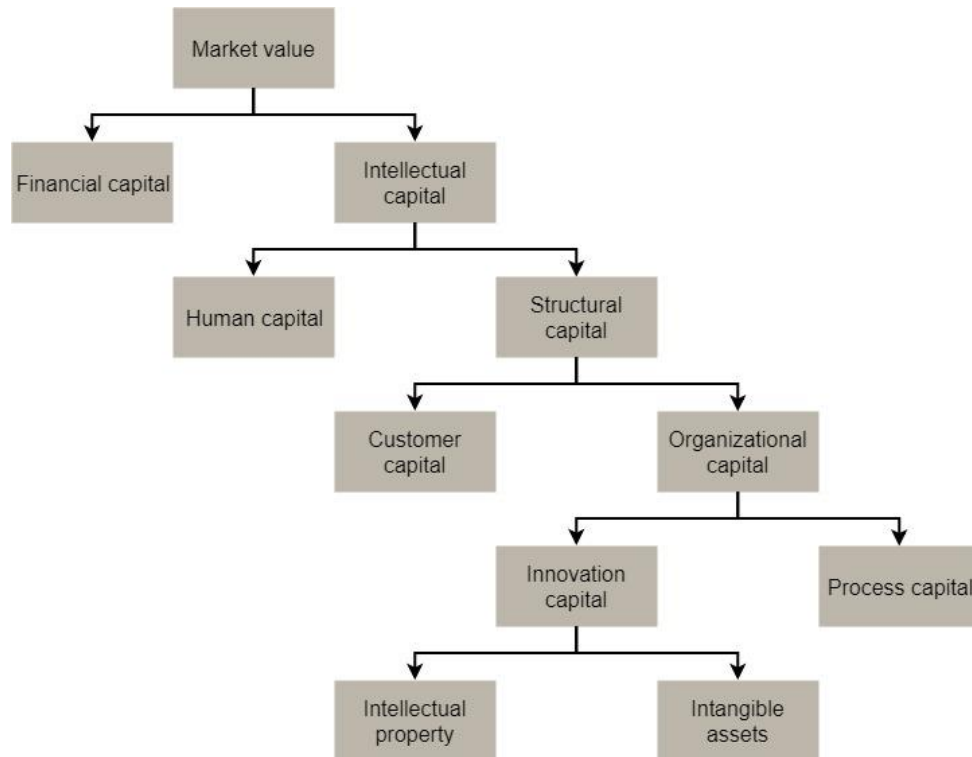
Figure 1: Skandia Value Scheme (Edvinsson, 1997)

2.2 Intellectual capital and firm value

FV is fundamentally computed basing on prospective cash flows gained from presumably infinite period of operations. In turn, the cash flows and their durability are highly dependent on firms' abilites in maintaining the CA in competitive markets. In other words, high firm value necessitates SCA. In extant theory, the two contrary approaches to SCA – industry organization view and resource-based view (RBV) have been popularized by Michael Porter (1985), Jay Barney (1991), Birger Wernerfelt (1984), and Margaret Peteraf (1993), respectively. This study puts an emphasis on RBV in justifiying the manner of creating SCA. The firm acquires a wide variety of resources – assets, capabilities, knowledge, or organizational processes in operations (Barney, 1991). Those resources can be classified into sorts of capital – physical capital and intellectual capital. In the post-World War II era, the physical capital played a cricial role in providing firms with CA in efficiency-driven economies.

However, since the late of 1990s some nations transformed into innovation-driven economies, in consequence, the IC has gained a considerable momentum for dominance in creating CA. In industries, firms have taken IC as the most powerful weapon to gain CA in the hyper-competition (Wang and Chang, 2005). As a result, IC has been not only classified but also managed in attempts of maximizing firms' performance through various comprehensive frameworks - Balanced scorecard, Skandia navigator, and Dow Intellectual Asset Management Model. In academics, a growing number of empirical studies have been conducted to investigate the contribution of IC and its elements to firm performance (FP). Positive relationships have been found significant in empirical studies – e.g., Smriti and Das (2018), Wang et al. (2018), Riley et al. (2017), Ozkan et al. (2017), Hejazi

et al. (2016), Sydler et al. (2014), Clarke et al. (2011), Nazari and Herremans (2008), Cohen and Kaimenakis (2007) and Wang and Chang (Wang and Chang, 2005), Tseng and Goo (2005), Firer and William (2003), Hitt et al. (2001), and Bontis et al (2000).

2.3 Human capital-based competitive advantage

Wang and Chang (2005) shows in Taiwanese IT industry from 1997 to 2001 FP is determined by both IC and interactions between IC elements (**Error! Reference source not found.**). Firstly, unlike customer expectactions which are out of firms' arms, internal processes are far easily to be altered by new designs. It is certain that firms tend to increase customer satisfaction by new internal process designs. This is the way how customer capital is influenced by process capital. In turn, the brilliant internal processes hardly happen by chance but need to be well designed, continously innovated and well implemented by qualified employees. In this way, process capital is determined by both innovation and human capital. Finally, firms need to hire highly qualified employees because employees' capabilities and knowledge are sources of innovation. Accordingly, HC is the starting point for establishing other IC elements and exerts indirect influence on FP (Bollen, Vergauwen and Schnieders, 2005; Wang and Chang, 2005; Nazari and Herremans, 2008).
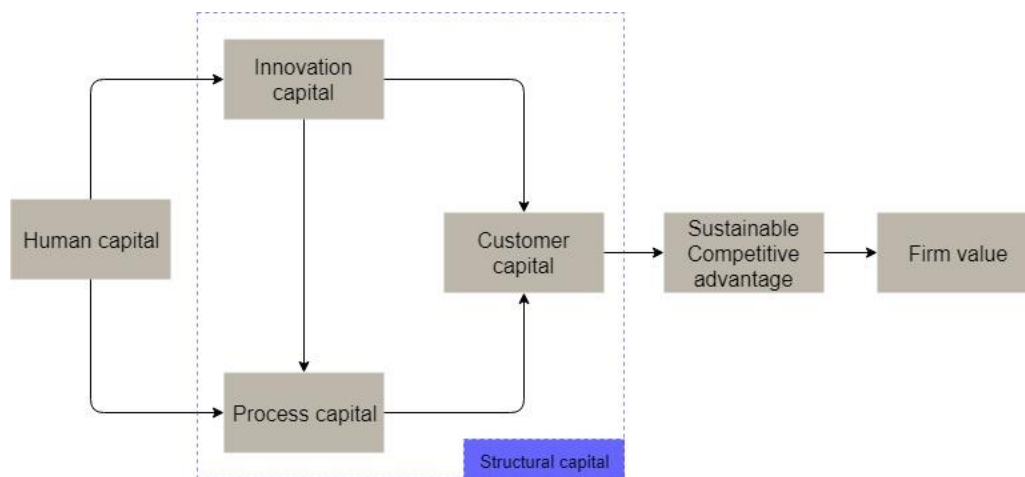
Figure 2: Interrelationship between IC elements and their impacts on performance (Wang and Chang, 2005)

HC also exerts direct influence on FP, especially in the presence of labor market frictions and firm specificity (Campbell, Coff and Kryscynski, 2012; Chadwick, 2017). These authors develop a new comprehensive framework for human capital-based competitive advantage. Accordingly, the comprehensive framework doesn't solely rely on firm-specificity human capital but features supply-side and demand-side mobility constraints to figure out how the human capital-based competitive advantage are created and sustained (Campbell, Coff and Kryscynski, 2012).

Clint Chadwick (2017) describes how labor market frictions and idiosyncratic firm capabilities and resources are employed to enhance CA through two processes – HC value creation and value capture (Figure 3). On the one hand, firms make attempts in lifting up the use value of human capital as much as possible to the maximum of potential value such as employing inherently scarce human capital, and firm complementaries. Riley et al. (2017) shows that firms will gain even larger value from their investments in human capital if those investments are combined with complementary assets, namely R&D, physical capital and advertising investments. Moreover, Vomberg et al. (2015) provides an evidence that there is complementary relationship between HC and brand equity. The findings of these two studies are totally consistent with the capabilities-based theory developed by David Teece (2015). Therefore, idiosyncratic complementarities justifies significant difference in human capital rent across firms (Chadwick, 2017).

On the other hand, on the purpose of capturing value generated by HC firms squeeze the HC cost by their capabilities in managing the HC administrative cost (e.g., infrastructure cost to acquire and retain HC) and abilities to leverage labor market frictions (e.g., information asymmetries regarding HC).
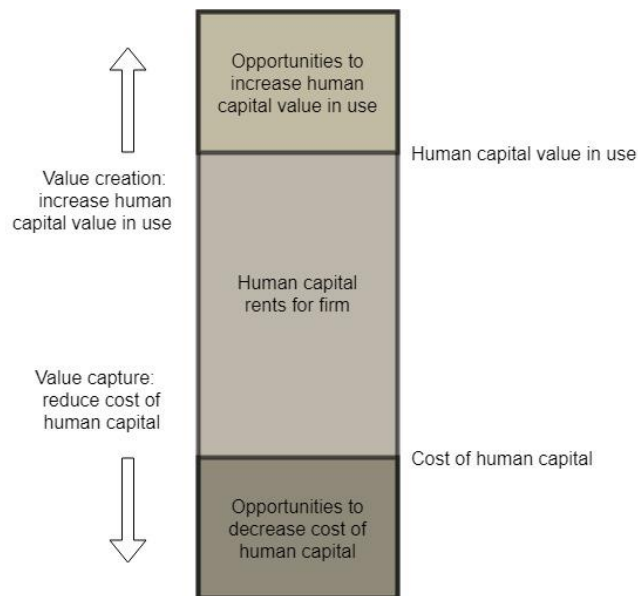
Figure 3: Human capital-based competitive advantage diagram (Chadwick, 2017)

In summary, HC ranks the first position in importance among elements of intellectual capital to CA (Wang and Chang, 2005; Clarke, Seng and Whiting, 2011; Alipour, 2012). Therefore, *human capital is the primary leading factor in which management should put the most effort* (Wang and Chang, 2005)

2.4 Sustained HC-based competitive advantage

A bundle of complementary resources, including production technologies, or patents proves importance to enhancing the demand-side mobilitiy constraint of workers. The sufficiently high demand-side constraint allows firms to improve the bargaining power over the workers, and thus helps firms create CA. However, the CA may be stripped away if the complementary resources are imimiated. In the words of Barney Jay (1991) or Birger Wernerfelt (1984), it is required that the key complementary resource be valuable, rare, inimitable, and nonsubstitutable (VRIN) in order that firms have SCA.

From the supply-side, mobility constraint can be imposed by mobility costs borne by employees. Particularly, idiosyncratic employee preferences for a given employer due to firm's attractive compensation package or convenient working location can increase mobility cost. Additionally, legal institutions – noncompete agreements and patent enforcement – also increase the mobility cost (Campbell, Coff and Kryscynski, 2012). Similiarly, firm can sustain CA if its resources that increase mobility cost are VRIN.

According to the above argument, as long as both demand-side and supply-side mobility constraints are kept high and idiosyncratic resources are inimitable, the firms can realize SCA. Intellectual property (IP), is a typical asset this study is dedicated to because nowadays IP is the underlying element of strategic managment.

2.5 Intellectual property rights reform

IPR through legislation is a solution for protecting IP from being imitated. A developed system of IPR effectively imposes severe punishments on rivals' copying reserved technologies (Helpman, 1993). In contrast, with a primitive system of IPR, successful innovations in products will be immediately imitated prior to recovery of R&D costs. Therefore, IPR assures SCA for innovating firms (Branstetter, 2017; Billette de Villemeur, Ruble and Versaevel, 2019), especially for the firms employing IC as a source of CA (Arrow, 1962). At macro level, reforms of IPR are strongly recommended if nations wish to enhance their competitiveness. First, IPR reform has relations with FDI inflows and technology transfer. The nations undergoing advances in patent rights benefit from massive flow of foreign investment (e.g., Eastern Europe in high-technology industries (Smarzynska Javorcik, 2004)), expansion of domestic firms (Branstetter *et al.*, 2011) and advanced technologies transferred through multinational companies (Wakasugi and Ito, 2009; Bilir, 2014).

2.6 Hypotheses development

Although relationship between IC and FP varies between studies conducted in different industries across nations, the substantial contributions of IC and its elements are undeniable. Consequently, the folllowing hypotheses are proposed:

H_1: IC positively affects firm value.

H_{1a}: HC positively affects FV.

H_{1b}: SC positively affects FV.

H_{1d}: the interaction between HC and SC positively affects FV.

In order to maximize FV, a wide range of factors which significantly contribute to SCA includes (a) the internal process, (b) improving innovative capabilities, (c) customer relation, and (d) human capital (Tseng and James Goo, 2005; Wang and Chang, 2005; Nazari and Herremans, 2008; Clarke, Seng and Whiting, 2011; Nimtrakoon, 2015). Importantly, investments in HC in particular and IC in general are proven more impactful on CA in the presence of complementary assets (Riley, Michael and Mahoney, 2017). However, CA is only sustained as long as strategic resources which complement the intellectual property are not imitated. Therefore, IPR reform is conducive to firm value driven by IC – especially in knowledge-intensive industries (Figure 4).

H_2: IPR reform moderates the relationship between intellectual capital and firm value.
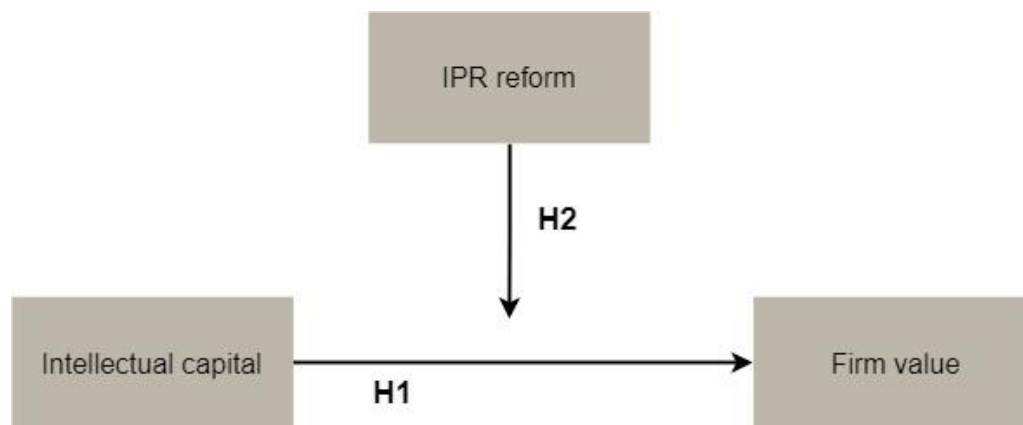
Figure 4: Conceptual framework of impact of intellectual capital on firm value with IPR reform as moderator

3. Methodology

3.1 Data

The study aims for the impact of IC on FV in presence of IPR reform using the sample of all non-financial companies listed on stock exchanges of Vietnam during 2011-2018. We exclude financial institutions and utility firms from the sample because of the difference in capital structure (Fama and French, 1992) as well as in financial statement form (Basil and Khaled, 2011). Accordingly, inclusion of financial firms in the sample might leads to both difficulties in interpreting financial statements (Basil & Khaled, 2011) as well as calculating financial criteria with bias (Fama & French, 1992). The panel dataset is unbalanced and is compiled from sources, including Thomson Reuters database, and firms' reports. The dataset consists of 1335 observations.

3.2 Variable definition

Tobin's Q, as a market-based measure of firm value, is defined as the sum of the market value of equity and the book value of long-term debt scaled by the book value of total assets (e.g., Connelly et al., 2012; Tran and Nguyen, 2018). According to the literature, changes in FV can be explained by IC, and its elements – HC and SC. The Pulic's VAIC^{TM} model is so popular that it still has been adopted by both academics as well as practitioners to measure IC since 2000 (Nimtrakoon, 2015) because of its simplicity. Additionally, the results of VAIC model are much more verifiable than those of other models (Young et al., 2009). Formulas in use for VAIC, SCE, HCE and CEE are presented in the *Table 1*

Table 1: Description of variables

Variable name	Proxy	Definition
Firm value (FV)	Tobin's Q	(Market value of equity + Book value of long-term debt) / Book value of total assets
Intellectual capital (IC)	HCE	VA/HC, where HC = total employee expenditures
	SCE	SC/VA, where SC = VA - HC
	VAIC	VAIC = ICE + CEE, where CEE = VA/CE
IPR reform	REFORM	For ex-IPR reform, REFORM takes value of 0; for post-IPR reform, REFORM takes value of 1. 2015 is identified as the landmark for IPR reform.
Firm size	SIZE	Ln(Book value of total assets)
Firm Age	AGE	Natural logarithm of number of years after foundation)
Financial leverage	LEV	Book value of total assets / Book value of common equity

More importantly, this study features the IPR reform as the moderator variable, which can exert influence on how IC contribute to FV. The firms operating in knowledge-intensive industries, for instance, inherently hinge on IC (e.g., intellectual property) to create competitive advantage. Therefore, a continuously improved IPR system enhance the IC's contribution to firm value. The study takes 2015 as the landmark for a significant reform of IPR in Vietnam.

The study includes several variables related to firm characteristics which are used in other studies as control variables. These include firm size (SIZE) (Riahi-Belkaoui, 2003; Zéghal and Maaloul, 2010), measured by the natural log of book value of total assets; firm age (AGE), measured by the natural logarithm of the year since the firm's establishing (Connelly, Limpaphayom and Nagarajan, 2012); financial leverage (LEV), measured by the ratio of book value of total assets to book value of common equity (Lev and Sougiannis, 1996; Zéghal and Maaloul, 2010).

3.3 Method

The study estimates coefficients using three regression models – Fixed Effect Model (FEM), and Random Effect Model (REM). Importantly, Hausman test is used to select the most suitable model. Additionally, the estimation strategy is proceeded through two sequential stages. At first, like popular previous studies the study regresses VAIC, HC, SC on FV. However, the fact that REFORM is included into the model as the independent variable denotes the novelty. In the next stage, due to the presence of IPR reform as the moderator, the study divides the study sample into two subgroups - ex-IPR reform and post-IPR reform groups – to regress VAIC, HC, SC and the interaction between HC and SC on FV.

4. Result analysis

The analysis of whole study sample shows the significance of HCE to the FV through models [1], [3] and [4] in Table *2*. Additionally, by referring to models [6], and [9] in Table *3* of the subgroup analysis we can see that all coefficients of HCE appear positive and statistically significant. Especially, in model [9] Table *3* the significant estimate of the interaction between HCE and SCE means HCE has the total effect on FV, which could be decomposed into indirect effect and the direct effect. Consequently, HC is consistently crucial to FV, regardless of different regression models in two analyses.

Table 2: Whole study sample analysis. FEM of FV on IC

Variables	[1]	[2]	[3]	[4]	[5]	[6]
HCE	0.018***		0.016***	0.016***		
	(4.440)		(3.300)	(3.320)		
SCE		0.389***	0.160	0.164		
		(3.170)	(1.140)	(1.170)		
VAIC					0.019***	0.019***
					(4.560)	(4.600)
REFORM				0.050		0.049
				(1.050)		(1.02)
AGE	1.238***	1.203***	1.242***	1.092***	1.239***	1.093***
	(7.570)	(7.330)	(7.590)	(5.030)	(7.580)	(5.040)
SIZE	-0.000	0.014	-0.004	-0.008	-0.001	-0.006
	(-0.010)	(0.220)	(-0.060)	(-0.130)	(-0.020)	(-0.090)

LEV	0.009 (0.980)	0.011 (1.160)	0.011 (1.140)	0.009 (1.020)	0.009 (1.010)	0.008 (0.890)
Const.	-2.695* (-1.750)	-3.158** (-2.050)	-2.707* (-1.760)	-2.178 (-1.350)	-2.691* (-1.750)	-2.176 (-1.350)
Obs.	1335	1335	1335	1335	1335	1335
F	3.920***	3.930***	3.930***	3.830***	3.910***	3.820***
Hausman	62.600***	61.540***	64.010***	28.42***	62.65***	26.84***
R^2	0.102	0.092	0.103	0.104	0.103	0.104
t-Statistics are shown in parentheses. *,**,*** Represent significance at 10%, 5% and 1% levels.						

Table 3: Subgroup analysis. FEM of FV on IC and the role of IPR reform

	Ex-IPR Reform									
Variable	[1]		[2]		[3]		[4]		[5]	
HCE	0.003	(0.710)					0.001	(0.280)		
SCE			0.110	(0.940)			0.098	(0.730)		
VAIC					0.002	(0.740)			0.003	(0.760)
HCE*SCE							-0.002	(-0.390)	-0.002	(-0.310)
AGE	0.621***	(3.170)	0.622***	(3.180)	0621***	(3.170)	0.625***	(3.180)	0.622***	(3.170)
SIZE	0.322***	(4.400)	0.318***	(4.330)	0.321***	(4.390)	0.315***	(4.270)	0.321***	(4.380)
LEV	0.006	(1.150)	0.008	(1.310)	0.006	(1.160)	0.007	(1.290)	0.006	(1.160)
Const.	-9.768***	(-5.450)	-9.723***	(-5.440)	-9.756***	(-5.440)	-9.654***	(-5.360)	-9.746***	(-5.430)
Obs.	595		595		595		595		595	
F	5.020***		5.030***		5.010***		4.940***		4.950***	
Hausman	39.850***		39.560***		39.860***		39.610***		40.210***	
R^2	0.182		0.183		0.182		0.184		0.182	
	Post-IPR Reform									
Variables	[6]		[7]		[8]		[9]		[10]	
HCE	0.034***	(4.290)					0.036***	(3.880)		
SCE			0.343*	(1.830)			-0.028	(-0.130)		
VAIC					0.033***	(4.330)			0.034***	(4.440)
HCE*SCE							0.018*	(1.670)	0.019*	(1.720)
AGE	0.941**	(2.430)	0.923**	(2.330)	0.946**	(2.440)	0.956**	(2.460)	0.966**	(2.500)
SIZE	-0.005	(-0.040)	0.051	(0.410)	-0.004	(-0.040)	-0.043	(-0.350)	-0.044	(-0.360)
LEV	-0.077*	(-1.920)	-0.099**	(-2.450)	-0.076*	(-1.900)	-0.073*	(-1.820)	-0.072*	(-1.790)
Const.	-1.543	(-0.530)	-3.038	(-1.030)	-1.598	(-0.540)	-0.582	(-0.190)	-0.629	(-0.210)
Obs.	740		740		740		740		740	
F	7.120***		7.010***		7.100***		7.130***		7.120***	
Hausman	8.720*		9.440*		8.620*		12.150*		12.470**	
R^2	0.080		0.048		0.080		0.085		0.086	
*,**,*** Represent significance at 10%, 5% and 1% levels.										

The IPR-reform once again takes a decisive role in enabling SC to enhance FV. This fact can be clearly affirmed by the comparison between coefficients of SCE of models [2] and [7] in the subgroup analysis Table *3*. It implies that improvements in IPR can protect the firms' strategic resources which create competitive advantage from being imitated by rivals.

From the above argument, all elements of IC have individual effects on FV with the presence of reforms in IPR. Moreover, the intellectual capital proxied by the composite index VAIC in the study sample analysis is proven to significantly affect the FV. In the subgroup analysis, the IPR reform clearly differentiate between influences on FV of changes in IPR. Particularly, the coefficient of VAIC in case of post-IPR reform not only is statistically significant but also is ten times higher than that of VAIC in the case of ex-IPR reform.

The role of IPR reform as the mediator is clearly highlighted by the profound differences between the study sample and subgroup analysis. On the one hand, in the regression models of IPR reform on FV of the study sample (model [4] and [5] in Table *2*) the coefficients of IPR reform are positive as expected but insignificant. In other words, reform doesn't explain any change in FV. On the other hand, all coefficients of HCE, SCE, VAIC, and

interactions between HCE and SCE in post-reform group are positive and statistically significant while those in ex-reform group are not significant Table *3*. This fact affirms IPR reform can exert significant impact on how IC, its individual elements (e.g., HC and SC) and the interaction contribute to the FV.

5. Conclusion

In the pursuance of competitiveness in knowledge era, both nations and enterprises entirely rely on intellectual capital because economic theories and an increasing number of empirical papers have affirmed the positive and statistically significant relationship between intellectual capital and economic growth and firm value. This study employs panel data on non-financial firms listed in two stock markets of Vietnam to test the contribution of intellectual capital, its elements and the interactions between elements to firm value in the presence of intellectual property rights reform as the moderator variable. The results are totally consistent with the theories and other empirical studies. However, the study has two unique findings, including (1) human capital is found as the leading element because it exerts direct as well as indirect influences on firm value and (2) intellectual property rights reform determines both significance and the strength of relationship between firm value and intellectual capital and each elements. Accordingly, the study carries important implications for decision makers in private and public sectors. Firstly, business strategists, especially of enterprises operating in knowledge-intensive industries, surely set the state of intellectual property rights as the first criterion when selecting destinations/market to make investments. Secondly, it is strongly advised that governments appreciate the importance of intellectual property rights if they want to accumulate intellectual capital on the purpose of transforming to the highest economic development stage, innovation-driven stage.

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Knowledge and Skills of Academics: A Critical Success Factor for Organisational Productivity in Higher Education Institutions in Nigeria

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Abstract: This paper reports on the state of knowledge and skills as a critical success factor of organisational productivity among academics in higher education institutions in Nigeria. The question that prompted this crucial discussion is how knowledge and skills enhance the effectiveness and efficiency of transformation in work performance in organisations. In this ever-changing world of digital technology, the application of knowledge and skills is a prerequisite in every area of human endeavour. Higher education institutions (HEIs) have become much more productive today because of the different knowledge and skills employed by academics. The capabilities and skills demonstrated by academics in providing solutions to specific problems has helped HEIs in Nigeria to become more productive. The purpose of this study was to examine the transformative role of knowledge and skills in the productivity of academics in HEIs in Nigeria. The implication of applying knowledge and skills in HEIs has brought different innovations, deepened ideas used in teaching and learning, consistency in instruction and administration, application of network technologies and different systems, use of tacit and explicit knowledge, for academic best practices. The quantitative research approach adopted in this study meant that the author made use of questionnaires to collect data from respondents in the sampled institutions in Nigeria. The data thus collected were then analysed using descriptive and inferential statistics. Findings from the research indicate that academics possess a tacit type of knowledge, which has made HEIs viable and productive in diverse areas of teaching and learning, research, community engagement and citizenship activities. The results show that academics applied certain skills involving search strategies to access online sources required for teaching, learning and research; technical skills to use different systems; decision-making skills; change management skills; and evaluation of job performance, which enabled them to carry out their responsibilities in the HEIs in Nigeria. High costs of personal computers, and software required by academics; irregular attendance of workshops, seminars and conferences; lack of cooperation among some academics; irregular use of library instruction; inadequate access to the Web for information retrieval; inadequate knowledge of best practices in their field of expertise; lack of support from the management of HEIs among others, were shown to militate against the organisational productivity of academics in HEIs in Nigeria. The study recommends proactive continuing education to update academics knowledge and skills in current trends in the teaching profession in order to advance organisational productivity and limit or overcome the aforementioned challenges.

Keywords: knowledge (tacit and explicit), skills, organisational productivity (work performance), teaching and learning, academics, higher education institutions (HEIs), Nigeria

1. Introduction and conceptual background

The author of this paper argues that knowledge and skills are pivotal for excellence in daily job performance. This critical success factor implies the execution of operations and the use of knowledge, ideas, insight, experience, skills and attitudes by academics in a manner that is inexplicable to what they know. The knowledge and skills of academics unravels unknowingly to them, especially when delivery teaching and learning processes. According to the academics, it is essential to base this critical success factor on how their knowledge and skills enhance the effectiveness and efficiency of transformation of work performance in higher education institutions (HEIs). In this ever-changing world of digital technology, the application of knowledge and skills is a prerequisite in every area of human endeavour. The feasibility of higher education institutions (HEIs) as organisations in today's digital world requires academics to make constant application of their knowledge and skills to drive their teaching, learning, research and other related activities in the organisation. The organisational productivity seen among academics in HEIs today is a result of the different knowledge and skills employed by the academics. The capabilities and skills demonstrated by academics in providing solutions to specific problems has enabled HEIs to function better, both in Nigeria and globally.

The concept of knowledge started with studies by Streep (1995), Aristotle (384 BC), Auden (1970), Pears (1971), Polanyi (1974), Miller, 1978), Ayer (1958) among others. These researchers indicate that, knowledge is like gravity – which cannot be looked with the naked eye; but could be observe only through its effects. It is an invisible and intangible asset, which could not be observed directly (Hunt, 2003:101). It could be viewed as belief that is true and justified, measured by methods that rely solely on the correctness of answers. Therefore, a

correct or incorrect answer is interpreted such that, the person knows or does not know anything (Hunt, 2003:100). For instance, if a computer analyst were asked about his/her knowledge of the use of the computer, his/her answer and self-assessment would provide multidimensional score about his/her knowledge of whether the remedy is correct or not about the knowledge assessment.

Previous arguments by O'Dell and Grayson (1998:3), Sveiby (1997:37), Russell (1948:381), Plotkin (1994:12), Hunt and Sams (1989) and Quine (1987:108-109) expanded the definition of "knowledge" to include invisible entity. Although, it has the capacity to act according to the distinction between either the behavioural potential, directly observed, or the observable performance or behaviour of the individual (Hunt, 2003:100). Additionally, Hunt, (2003:102) stresses that the knowledge possessed by an individual facilitates successful work performance. Such a person can possess considerable knowledge as a result of learning, but the knowledge of that individual remains as a source of hidden power, unless the person uses that knowledge to do something, such as perform a task, understand a situation, make a decision or solve a problem. Despite its inaccessibility, knowledge as power over work performance can be overwhelming (Hunt, 2003:102-103).

Mattauch and Caumanns (2003:23) are of the view that knowledge and information have been categorised as new economic factors of production in this knowledge economy. In support of this, Schaub and Zehnke (2000:316) explain that knowledge is acquired through learning processes and social interactions. Probst et al (1997:44) indicate that knowledge comprises the capabilities and skills applied by individuals to provide solutions to specific problems. Several studies in knowledge management (e.g. Polanyi 1966, 1969; Nonaka and Tekauchi, 1995) provide instances of two types of knowledge, namely explicit and tacit. Explicit knowledge is the type found in books or documents, which can be accessed with ease and transferred among individuals, while tacit knowledge is hidden in the form of individual capacities, insight and experiences (eSCC, 2004:47).

Previous studies by Petersen et al (2005), OECD (2004), IFIP and WITSA (2002), ICT skills monitoring group (2002), Empirica (2002), Schaub and Zehnke (2000), Dixon (2002), Behringer and Coles (2003) and Castelli (2004) conclude that skills are seen as capabilities in physical or psychological attributes of an individual. The attributes relates to different content and context, acquired and mastered through activity-related approaches of professional and non-professional training. This concept is simplified in the diagram below.
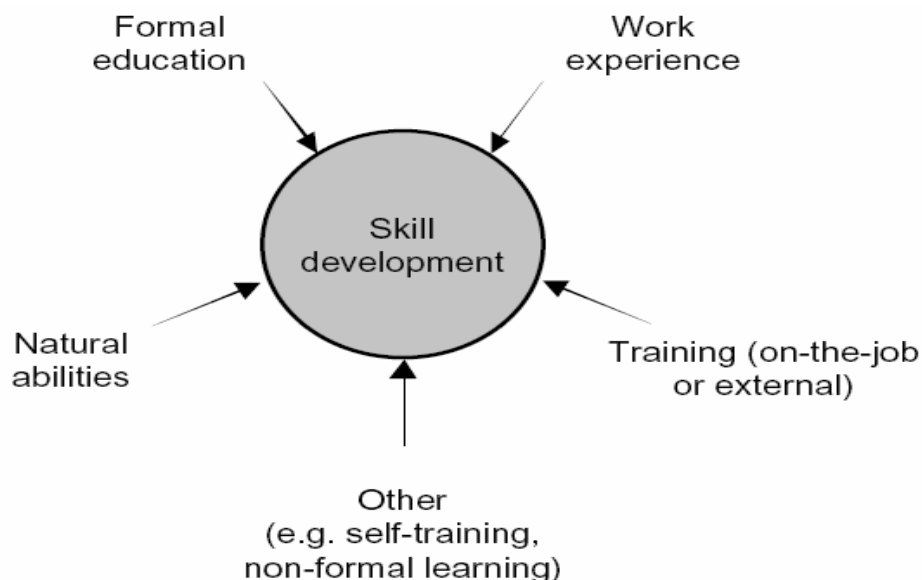
(Source: ICT skills monitoring group, 2002:13).

Figure 1: Some routes through which e-skills are acquire

E-skills – also known as ICT skills – as depicted in figure 1, indicate that, skill development comes in diverse ways. It is could be acquired either through formal education, work experience, training on the job, natural abilities and non-formal learning (ICT skills monitoring group, 2002:13). The author emphasis that knowledge and skills differs in context and nature. With reference to figure 1, someone could have basic knowledge about a particular thing but might not have the necessary skill in execution of that thing/job. Therefore, the act of acquiring skills

require the preparedness of the individual to learn, unlearn, and adapt to best practices. The acquisition of ICT skills/e-skills relies heavily on the strategic ability of the individual willingness to acquire basic knowledge, skills and qualifications necessary to compete in the labour market. Such knowledge, skills and qualifications may be acquire through various stages of formal education in schools, vocational training, universities, and so on. Figure 1 represents that, author understands that skills and knowledge cannot be acquire without following some of the routes mentioned in the figure 1. The acquisition of knowledge and skills are fundamental to every sphere of human endeavour. Knowledge and skills are both imperative in application of work performance. Knowledge is acquired through advance in continuous study or learning and unlearning while skill is practices in nature. Skills are hidden component of knowledge and both may be acquired through diverse means.

Knowledge management (KM) is essentially a rebranding of information management, providing a new science in the field of librarianship. It involves the management of explicit and tacit knowledge (Skyrme, 1997), namely capturing, organising and disseminating that knowledge within an organisation (Bender, and Fish, 2000). Jantz (2001:3) considers KM to be primarily a business activity in which the use and reuse of knowledge creates business value in terms of profits, improved return on investment or some other quantitative measure. As HEIs continue to struggle with the compelling diverse needs of their students and staff members, there is a need to consider the acquisition of adequate knowledge and skills for survival and success in the business world. While knowledge and skills feature increasingly in scholarly research, little effort has been devoted to the study of how they can improve activities related to teaching and learning, research and community engagement in HEIs in Nigeria. The need to compete internationally; result to implementation of knowledge and skills in HEIs (Wen, 2005), thus requiring driven internet-based services, where information and knowledge in electronic format the most resources in use (Wen, 2005).

The mission/goal of KM, from when it was first proposed by Nonaka et al (1996, 2000), was meant to make full use of the knowledge that exists within a corporation, since this would increase the productivity and operational efficiency of staff members, giving them a competitive advantage (Branin, 2003). In recent times, academics in HEIs have shown great interest in KM, considering its similarity to the concept of coding, storing and transmission of knowledge, which is the primary focus of libraries (Townley, 2001). Academics could harness the opportunity presented by this concept of coding, storing and transmission of knowledge to produce better lecture notes for their students and, at the same time, to carry out research activities. KM is a means for organisations to grow stronger and improve their productivity in a climate of uncertainty (Knowledge Management Research Centre, 2010). This means that if HEIs were to apply it in their environment, there would be a shift from people working with their hands or tools to people working with their heads/minds, that is, from tangible resources to intangible resources (Davenport, 2002; Boom, and Pimentel, 2009). Therefore, in keeping with what is happening globally, HEIs in Africa and, specifically, Nigeria could be part of a knowledge-based economy, applying knowledge and skills in all activities. Consequently, academics in HEIs consider knowledge and skills a critical success factor in organisational growth.

The use of certain components of ICTs involves the potential of people, and the people require skills, competencies, intuition, commitments and motivations to carry out their obligations (Hawkins, 2000). This in turn, is determined the classification of explicit and tacit knowledge. Explicit knowledge referred to as formal knowledge that can be expressed in formal language. It can be represented, shared among individuals and applied effectively (Evangelista, Esposito, Lauro, and Raffa, 2010). In contrast, knowledge related to the senses, tactile experiences, movement skills, intuition, unarticulated mental models or implicit rules of thumb are tacit forms of knowledge. Tacit knowledge is rooted in action, procedures, routines, commitment, ideals, values and emotions (Nonaka et al, 1996, 2000). Tacit knowledge is sometimes difficult to express, represent and communicate if the knower is unwilling to do so. It is describe as personal knowledge embedded in an individual's brain, representing his/her experience and involving intangible factors, such as personal belief, perspective, instinct and values (Nonaka, 1994). The distinction between explicit and tacit knowledge is necessary because the primary problem in handling explicit knowledge is that of managing its volume and ensuring its relevance, while the challenge faced in handling tacit knowledge is that of translating the knowledge into a communicable form (Minonne, 2007).

2. Problem and purpose of the study

The author of this paper, having worked as a lecturer in the Department of Library and Information Science, Delta State University in Abraka, Nigeria, for over eleven (11) years, has observed that, many academics are not exhibiting their knowledge and skills as required, especially in research activities, such as writing research papers and attending conferences and workshops/seminars, both within and outside their work environment. In order to deepen their understanding, academics needs to learn and unlearn in other areas of specialisation. For research purposes, the author of this paper has visited other African countries, such as Kenya, Rwanda and South Africa, and observed that some academics do not possess adequate knowledge, skills, experience, exposure and attitudes in the execution of their jobs, especially in respect of their subject domain, teaching, learning and research investigation. Based on his interaction with several colleagues in the aforementioned countries, the author can attest to the superficial nature of their mode of presentation during the time of his visit. For instance, during the discussions, some of his counterparts could not explain how certain phenomena are applied in HEIs, even when they professed to possess a PhD. This shortcoming/deficiency could also be evident in the use of modern information and communication technologies (ICTs) and social media in teaching and learning processes in HEIs in Nigeria. Several academics in HEIs in Nigeria have indicated that they find it difficult to use ICTs in the execution of their work. This points to a paucity of knowledge and skills for organisational growth in relation to job performance, as without performance, there can be no productivity.

Knowledge and skills are a critical success factor for organisational productivity. Without them, no organisation can flourish, even in the midst of adequate material resources. The author of this study considered that some academics might be reluctant to reskilling in order to acquire more knowledge and skills; alternatively, it is possible that the organisational culture does not support such a drive and the policies guiding the operations of the organisations (HEIs) do not make provision for such reskilling. An important factor that could prompt an individual to acquire more knowledge and skills is competition: when there are no rivals, people are not motivated to acquire more knowledge and gain new skills in order to function better. Studies by Yukselturk and Bulut (2009), Yildirim (2007), Gulbahar (2005), Mumtaz (2000), Albirini (2006), Knezek and Christensen (2002), Deaney et al (2006), Komis (2006), Ertmer (2005), Gobbo (2001) Woodrow (1992), Bordbar (2010), Chigona, and Chigona (2010) and Buabeng-Andoh (2012), lay supports on best practices in skills and knowledge application as essential components in diverse contexts and contents. However, failed to consider knowledge and skills of academics as a critical success factor for organisational productivity in HEIs; hence the need for the current study.

3. Purpose of the study

This study investigates the knowledge and skills of academics as a critical success factor for organisational productivity in HEIs. The study has the following research objectives:

▪ Examine the purpose for which knowledge and skills of academics in HEIs in Nigeria are required.

▪ Identify the type of knowledge and skills required by academics in HEIs in Nigeria.

▪ Explore how knowledge and skills are applied by academics in HEIs in Nigeria.

▪ Determine the challenges faced by academics in applying their knowledge and skills in HEIs in Nigeria.

4. Theoretical background

This study is anchor on the social constructivist theory, proposed by Jean Piaget (1896–1980) and later modified by Lev Vygotsky (1896–1934). This theory is a sociological theory of knowledge. It applies the philosophical constructivism of a social setting and helps a group of people to construct knowledge for themselves/ for their group. This theory came about through cultural collaborative creation and sharing of artefacts in a meaningful way. Those immersed in culture of this sort learn from one another on different platforms. Importantly, personal cognitive development usually takes place during this time. Constructivism denotes the theory of knowledge that explains how humans generate knowledge through the interaction between human experiences and ideas.

The formalisation of Jean Piaget and Lev Vygotsky's theory of social constructivism features in the mechanism of knowledge internalisation by learners. This theory suggests that through the process of accommodation and assimilation, individuals generate knowledge from experience, insight and the environment in which they find themselves. Therefore, when academics working in HEIs assimilate knowledge, there is an absorption of new experiences into an existing framework, without really changing that framework. This becomes easier when the

academic's experience is align with the internal depiction of the real world, but it may happen even if the academic does understand or notice events but decides that such events are unimportant. Therefore, when academics' knowledge and experience are in opposition to the internal vision of HEIs, they are likely to change their perception of the experience and knowledge to fit into their own internal representation. It can be observe in the theory of accommodation that, one's mental reasoning of the external world is that, acquiring new experience is based on the understanding that, failure leads to learning. When academics act on the expectation that this world operates in a certain way and their expectation is not realised, such academics often fail. However, by accommodating new experience and reframing their thoughts about how the world works, academics could appreciate and learn from their experience of earlier failure. As academics continue to learn and work with other colleagues in HEIs, they can improve their knowledge and skills through interaction with the environment, thus becoming less dependent on the method of acquiring the learning. Academics have always acted upon new knowledge by transforming the information, based on pre-existing experiences and skills. The author of this study adopted this theory of accommodation and assimilation, postulated by Jean Piaget and formalised by Lev Vygotsky, to support his argument of the critical success factor of knowledge and skills of academics for organisational growth in HEIs in Nigeria.

5. Methodology

The quantitative research approach, which makes use of survey, was applied in this study. The author of this study used a questionnaire to identify and collected data from the HEIs for this study. The sampled HEIs were the following: Admiralty University of Nigeria, Ibusa/Ogwashi-kwu; College of Education, Agbor; College of Education, Warri; Delta State University, Abraka; Delta State College of Education, Mosogar; Delta State Polytechnic, Ogwash-kwu; Delta State Polytechnic, Otefe, Oghara; Delta State Polytechnic, Ozoro; Delta State School of Health Technology, Ofuoma-Ughelli; Drisoft Institute of Computer and Accountancy, Warri; Federal College of Education, Technical, Asaba; Federal University of Petroleum Resources, Effurun; Film and Broadcast Academy, Ozoro; National Open University of Nigeria, Asaba; Nigerian Naval Engineering College, Sapele; Petroleum Training Institute, Warri; State School of Nursing, Eku; State School of Nursing, Asaba; State School of Nursing, Sapele; State School of Nursing, Warri; United College of Commerce, Warri; and Western Delta University, Oghara (Naijapals, 2019). The author of this study purposively chose two academics from each of the identified HEIs in Delta State, Nigeria. The population for the study was therefore 44 academics across the 22 HEIs in Delta State. The purposively selected academics were each given a questionnaire to complete during the author's research visit to the identified HEIs. The justification for selecting the identified HEIs was the nature of the research, namely academics' knowledge and skills as a critical success factor for organisational growth. Since the research relates to academics in HEIs, the author felt that applying a purposive sampling technique would be more suitable; hence, this study was limited to only those in Delta State. The data collected were analysed using descriptive and inferential statistics. The results obtained are presented in the following tables.

6. Results

The results of this study were analysed under the following sub-titles, namely: purpose for which knowledge and skills of academics are required in HEIs, types of knowledge and skills required by academics, how knowledge and skills are applied by academics and challenges faced by academics in applying their knowledge and skills.

6.1 Purpose for which knowledge and skills of academics are required in HEIs

Table 1: Purpose for which knowledge and skills of academics are required in HEIs N= 44

Purposes	F	%
Nurture students in their various capabilities	38	86.4
Transformation in pedagogy learning	43	97.7
Scholarly communication	40	90.9
Enhance teaching, learning and research	44	100
Profound understanding	43	97.7
Solve diverse problem of academic, political and socio-economic	42	95.5
Needed for critical thinking and applications	43	97.7
Help to unravel uncertainty	44	100

Purposes	F	%
Abilities of success is dependent on it	44	100
Help in changing a person in social growth	40	90.9
Personal effectiveness in moral thought	44	100

Data from field work, 2019

6.2 Type of knowledge and skills required by academics in HEIs in Nigeria

Table 2: Types of knowledge and skills required by academics in HEIs N= 44

Types of knowledge and skills	F	%
Knowledge		
Tacit (those embedded in human brain and mind-internalised)	44	100
Explicit(those found in books and printed documents)	44	100
Skills		
ICTs skill	43	97.7
Project management skill	40	90.9
Technical skill	44	100
Managerial skill	43	97.7
Interpersonal skill	43	97.7
Change management	43	97.7
Research and publishing skill	44	100
Search strategies and familiarisation with online sources	44	100
Monitoring and evaluation of work performance	44	100
Intercultural competency skill	40	90.9
Commitment to service delivery	44	100

Data from field work, 2019

6.3 How knowledge and skills are applied by academics in HEIs

Table 3: How knowledge and skills are applied by academics in HEIs N= 44

How knowledge and skills are applied	F	%
During teaching and learning processes	44	100
Research activities	43	97.7
Community engagement activities	42	95.5
Mentorship programme	43	97.7
Attending conferences, workshop and seminars	43	97.7
Multiple project executions	40	90.9
Personal research work	44	100
Marking and grading students examination scripts and papers	43	97.7
Examining students project/dissertation work	43	97.7
Policy of the institution evaluation	43	97.7
Curriculum development on subject matter	44	100
During board meetings with other colleagues	44	100
During international discourse on personal development	44	100
Research visit across other institutions	42	95.5

How knowledge and skills are applied	F	%
Evaluation of personal development and growth since one's career	44	100

Data from field work, 2019

6.4 Challenges faced by academics in applying their knowledge and skills

Table 4: Challenges faced by academics in applying their knowledge and skills   N= 44

Challenges faced	F	%
Ability to work independently	44	100
Unable to understand the graphical context of their HEIs for proper functionality	43	97.7
Inconsistency in reskilling	42	95.5
Inadequate knowledge in their subject matter	43	97.7
Unwillingness for mentorship programme	43	97.7
Inadequate exposition to ICTs and other modern technologies needed for teaching	43	97.7
Procrastination in research and publishing skill acquisitions	44	100
Technophobia in familiarisation with online sources	44	100
Inability to evaluate personal work performance	44	100
Lack of cooperation from other colleagues to work as team	40	90.9
High cost of hardware and software needed for teaching and learning in HEIs	44	100

Data from field work, 2019

7. Conclusion

Findings from the research indicate that the respondents from the various HEIs sampled had different views regarding the purpose for which knowledge and skills were required by academics in the execution of teaching and learning processes. Basic tacit and explicit types of knowledge are required in order to transform the organisation in terms of growth in HEIs in Delta State, Nigeria. The tacit and explicit knowledge and skills of technical skill, managerial skill, interpersonal skill, change management, research and publishing skill, search strategies and familiarisation with online sources, among others, have become crucial in present-day HEIs across the world. Academics are believe to flourish if this knowledge and these skills applied appropriately in the teaching and learning processes at HEIs. The findings reveal that the knowledge and skills of academics have helped them to accomplish several tasks relating to teaching, learning, research, community engagement, and self- development and mentoring, among others. This may attribute to academics' attitude to information literacy efficacy and their willingness to attend workshops, seminars and conferences, to broaden their horizons. It is believe that productivity in diverse operations of teaching and learning, research, community engagement and citizenship activities is dependent on sacrificial effort of academic staff members. Certain challenges, which affect academics' knowledge and skills in their job performance, were mention in this study. They includes: ability to work independently, inability to understand the graphical context of their HEIs for proper functionality, inconsistency in reskilling, inadequate knowledge of their subject matter, unwillingness to participate in a mentorship programme, inadequate exposure to ICTs and other modern technologies needed for teaching, procrastination in research and publishing skills acquisition, and technophobia in with online sources. The intellectual abilities of academics are crucial in today's environment. It is envisage that, when academics' metacognitive abilities are harness, and sustained, it would results in greater organisational productivity in HEIs in Nigeria. The author of this study therefore recommends proactive continuing education to update knowledge and skills in the teaching profession in order to improve organisational productivity in HEIs in Nigeria and other African countries.

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Effects of Collaboration and Coercion on Inter-Organizational Knowledge Transfer

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Abstract: Fatal or serious occupational accidents occurring in Quebec are analyzed by the body responsible for the management of occupational injuries. After analysis, this organization transmits recommendations intended to correct the dangerous situations at the origin of these accidents. This process has the characteristics of an inter-organizational transfer of knowledge as delivered by several authors (Slaughter and Kirsch, 2006, Ko et al, 2005), That is to say a dyadic exchange process in which the source transmits knowledge to be used by a receiver. According to the different models of inter-organizational transfer, this transfer occurs in a unidirectional mode and, by its nature, is carried out based on free choice. However, with regards to the inter-organizational transfer that this organization carries out, it derogates from these models on two points: the collaboration between the sender and the receiver as well as the legal obligation for the receiver to apply the knowledge received. These are until now two untreated aspects of the literature that our empirical study attempts to delineate. The study adopted a descriptive research method, both quantitative and correlational. The data collection instrument used is an online questionnaire. It was completed, completely or partially by 83 out of 97 companies that had agreed to take part in the research. That amounts to an overall participation rate of 85.5%. The results obtained show that the inter-organizational transfer of knowledge from fatal or serious occupational accident investigations is different from the usual models of knowledge transfer. They show, in addition, that the legal obligations to collaborate and implement the transferred knowledge have a positive influence on the effectiveness of the application of transferred knowledge.

Keywords: transfer, inter-organizational, knowledge, work accident, collaboration, constraint

1. Introduction

The Quebec Commission for Standards, Health and Safety at Work (CNESST) is responsible for the management of the occupational health and safety (OHS) system in the province of Quebec. More specifically, its objective is to ensure the protection of workers and improve the quality of the workplace. In that respect, the CNESST is responsible to carry out an investigation whenever a fatal or a serious workplace accident occurs.

At the end of each investigation, the CNESST prepares a report articulated around the following 4 main axes: the presentation of the facts related to the accident, the description of the resulting consequences, the analysis of the causes at the origin of the accident and the formulation of a number of rules to correct dangerous situations. Subsequently, the knowledge generated by the investigation is transferred to the organizations concerned. This process can thus be characterized as an inter-organizational transfer of knowledge in the sense of Slaughter and Kirsch (2006) or of Ko et al (2005): that is, a dyadic exchange process in which a source transmits available knowledge in order for it to be learned and applied by a receiver. Therefore, the free consent of both parties is a starting point for the process of inter-organizational transfer. Indeed, it is generally accepted that, in order for an inter-organizational transfer of knowledge to take place, there must first be a vision and shared values between the two parties, and that the knowledge to be transferred makes it possible to realize innovations.

However, the inter-organizational knowledge transfer carried by the CNESST does not integrate a decisive aspect: the influence of the legal constraints to which the receiving companies are subject. These legal constraints are of two (2) orders: on the one hand, an obligation to collaborate in the investigation to be performed by the CNESST, and, on the other hand, the obligation to implement the transferred knowledge so as to make the situations conform to the rules, that is to say safer. The obligation to collaborate means that the receiving companies participate in the development of the knowledge to be transferred. The obligation to implement the transferred knowledge (rules and recommendations) by the receiving companies eliminates dangerous situations that could compromise the health and safety of workers and promotes the compliance with the law as well. The effects of these two legal constraints are, to date, little or insufficiently defined dimensions. Part of our research has attempted to remedy to this problem. Our research has two main goals:

- to describe the practicalities and processes by which the inter-organizational transfer of knowledge takes place as a result of workplace accident investigations;
- to verify the influence of the legal constraints to which the workplaces are subjected on the process of knowledge transfer resulting from investigations of workplace accidents;

2. Theoretical overview

In general, knowledge transfer can be defined as the process by which a unit (individual, group, department, division) is affected by the experience of the other (Argote et al, 2000). For Slaughter and Kirsch (2006), it is a dyadic exchange process in which a source makes knowledge available to be acquired by the recipient. Ko et al (2005), for their part, define the transfer of knowledge as the communication of knowledge from the source, which is learned and applied by the receiver. The unidirectional model (a dyadic exchange between an emitter and a receiver) is largely predominant in the field of health (Dagenais, 2006). In the field of OSH, Guzman et al (2008) define transfer as "a process that leads to the appropriate use of the latest and best research knowledge to help solve concrete problems".

Knowledge transfer can be viewed as a process or as a product. Apprehended in terms of processes, knowledge transfer leads to a participatory process that involves a collaboration between the two parties in question, whose aim is to identify needs, choose the necessary adaptations and to actualize current knowledge (Parent et al, 2007 Kumar and Ganesh, 2009). When the transfer is considered a product, transferred knowledge is in that case intended to help make decisions, solve problematic situations, and change behaviors (Landry et al, 2003, Amara et al, 2004).

Specifically, inter-organizational knowledge transfer is a process that involves two distinct organizations: the one that emits knowledge (sending organization) and the one that receives it (receiving organization). This is what Easterby-Smith, Lyles and Tsang (2008) mean when they affirm that inter-organizational knowledge transfer involves at least two organizations. This has led some authors to define inter-organizational transfer as the transmission of specific knowledge from one organization to another (Buckley et al, 2009), or the beneficial use of knowledge originating from another organization (Vaara et al, 2010), or the process by which an organization identifies and learns specific knowledge that exists in another organization (Oshri et al, 2008). Therefore, by its very nature, inter-organizational transfer is a free (unconstrained) choice for organizations to learn and gain valuable resources, including knowledge held by other organizations (Ranft and Lord, 2002; Ahuja and Katila, 2001).

The inter-organizational transfer of knowledge is a complex phenomenon, difficult to achieve in practice, because of the multifaceted nature of the frontiers, cultures and processes involved (Easterby-Smith, Lyles and Tsang, 2008). According to these authors, this process is carried out in an interactive dynamic between the two organizations, and this dynamic can be influenced by four major factors: power relations, trust and risk, structures and mechanisms, and social links.

The knowledge to be transferred can be tacit (not formalized) and/or explicit (codified, therefore more easily transferable). The transfer of tacit knowledge is more difficult and requires a greater presence and involvement of the parties and is generally only considered within social networks, through informal relationships (Argote et al, 2000). In the case of an inter-organizational transfer, the knowledge that is the subject of the transfer is to some extent codified, and therefore explicit, and can take various forms, including reports, diagrams, and so on. Indeed, inter-organizational transfer can be achieved through several mechanisms (Easterby-Smith, Lyles and Tsang, 2008 ; Mason and Leek, 2008), including the training of the members of the recipient company, the transfer of experienced staff , the supply of documents and the holding of conferences.

The inter-organizational transfer of knowledge is generally approached in the literature under three (3) main angles: the analysis of the strategic interests that an issuer may have to transfer knowledge to a receiver (Hamel, 1991, Soosay and Hyland, 2008; Mesquita et al, 2008); the study of vertical relations between the two parties (Dyer and Nobeoka, 2000, Prévot and Spencer, 2006, Mesquita et al, 2008); a review of how to move knowledge from one sending organization to another receiver (Argote et al, 2000, Prévot, 2011).

The inter-organizational transfer of knowledge is thus generally presented as a source of advantages for receiving organizations, especially when they do not have the possibility to produce this knowledge themselves.

This has led some authors (He et al, 2011, Buckley et al, 2009) to believe that inter-organizational knowledge transfer helps to ensure that recipient organizations are more efficient and productive. Also, the transfer of knowledge from public institutions to businesses can be seen as a means for government policies to support the implementation of occupational health and safety management systems (Hasle and Zwetsloot, 2011).

One of the main limitations of the studies carried out on the inter-organizational transfer of knowledge is that it is generally approached from the point of view of innovation: inter-organizational transfer brings new knowledge to the organizations that could enable them to develop new products, therefore increases the capacity for innovation. However, in the case of knowledge transfer carried out by the CNESST following fatal or serious occupational accident investigations, the transferred knowledge is explicit: it is developed by experts and aims to solve problems, notably by safer work situations that comply with OHS legislation. In this perspective, the transfer is part of a problem-solving dynamic, since transferred knowledge is used "to inform decision-making, to change individual or organizational behavior, to develop policies and programs, or to change an occupational practice"(Lemire et al, 2009).

3. Method

3.1 Research strategy

A descriptive research method, both quantitative and correlational, is adopted. A quantitative descriptive method is chosen because it allows to obtain new knowledge on an under-researched subject (Fortin and Gagnon, 2016). The descriptive correlational method aims, in turn, to explore and describe the possible association relationships between the different variables present.

3.2 Target population and sample size

The target population of the research concerned all the companies surveyed by the CNESST following a serious or fatal work accident that occurred between 2013 and 2017. There were 198 cases identified. Two additional criteria helped refine the targeting of companies:

- the investigation report is made public and is available;
- the company still existed at the start of the study.

There were 179 companies meeting these two additional criteria. After communicating with them, only 97 accepted to take part in the research. Several companies that did not want to participate justified their refusal with many reasons. Two reasons stood out. The first is related to the emotions generated by the accident. These emotions remained alive, which made the enterprises unable to talk about them at the risk of awakening painful memories. The second reason is that, for several companies, the case is still pending in court as a result of being challenged.

3.3 Collection and processing of data

The data collection instrument used is an online questionnaire. It is built around 106 fields to fill and questions grouped around 6 main sections: socio-demographic characteristics, the organization of the management of the OHS, the level of involvement of the workers and the conformity with the laws, the conditions of elaboration and transmission of survey reports, assessments of the progress of the process and, finally, availability to participate or not in a second qualitative phase of the research.

The 97 participating companies received, by email, a link allowing them to access the online questionnaire. A week later, a first relaunch, again by email, is made. Two weeks later, a second and final solicitation, this time by phone, is made. Finally, the data collected by Lime Survey is directly transferred into a data processing software (Excel).

4. Results

4.1 Response rate

Of the 97 participating companies, 83 of them filled and sent the questionnaire. That corresponds to an overall response rate of 85.5%. Of the 83 companies, only 26 (31.3%) responded completely to the questionnaire, against 57 (67.8%) who refrained from completing one or more sections. Thus, the response rate is not uniform

and varies according to the 6 main sections of the questionnaire. Table 1 presents the response rates obtained according to the different sections of the questionnaire.

Table 1: Response rate according to the different sections of the questionnaire (n = 83)

Nº	Main sections of the questionnaire	Number of responses received	Response rate
1	Sociodemographic characteristics	47	56,6%
2	Organization of Occupational Health and Safety Management	38	45,8%
3	Level of worker involvement and compliance with laws	42	50,6%
4	Conditions for the preparation and transmission of investigation reports	36	43,4%
5	Assessment of the progress of the process	31	37,3%
6	Availability to participate or not in a second qualitative phase	26	31,3%

4.2 Mechanisms and characteristics of inter-organizational transfer between CNESST and companies

Formally, the process of inter-organizational transfer of knowledge between the CNESST and the companies is organized around three distinct but interrelated parts:

▪ the body responsible for conducting investigations (issuing organization);

▪ the development of knowledge and its transfer;

▪ companies receiving the developed knowledge (receiving organizations).

4.2.1 The sending organization: The CNESST

Investigations of fatal or serious occupational accidents carried out by the CNESST are conducted by occupational health and safety inspectors. Each survey is conducted by a pair of inspectors with complementary skills: one controls the investigation process and the other has knowledge of the sector of activity where the accident took place. A manager is responsible for ensuring the proper running of the survey. The two inspector-investigators are supported by internal and / or external specialists of the CNESST.

The level of credibility of CNESST inspectors in charge of the survey is considered satisfactory by 41.9%, or very satisfactory by 29% of the companies that responded to the questionnaire. In the same vein, 55.6% of responding companies say they have, from the outset, full confidence in the expertise of the CNESST to make the correct diagnosis and make relevant recommendations against 27.7% who did not hold such a belief.

4.2.2 Development and transfer of knowledge

The course of the investigation, which makes it possible to develop the knowledge to be transferred, is articulated mainly around six (6) steps:

▪ Step 1: collecting, in the workplace, the facts that led to the fatal or serious accident. This leads the investigating inspectors to, among other things, identify all the clues, take pictures, sketch the accident scene, talk to the witnesses, consult all the relevant documentation, and so on.

▪ Step 2: sorting all the collected information in order to establish the list of facts. In this context, a fact is understood to be any act, phenomenon, action, thing or event that has occurred and has been recognized as being certain and incontestable;

▪ Step 3: classifying all the facts. Indeed, the facts identified and recognized as having participated in the work accident are sorted into unusual facts (dysfunctions) and permanent facts (facts related to the prescribed work);

▪ Step 4: grouping of the selected facts according to the nature of the risk factors: the factors related to the worker victim of the accident, the factors relating to the execution of the task at the time of the accident, the factors concerning the tools and equipment used and the factors that result from the work environment;

▪ Step 5: establishing a coherent arrangement of the facts in the form of a diagram called "tree of facts". The latter makes it possible to visualize the facts that led to the accident and, subsequently, to facilitate the choice of preventive measures to avoid the occurrence of a similar accident;

▪ Step 6: elaborating and then transmitting an investigation report. The report contains mainly recommendations, or sometimes obligations relative to the corrections that have to be made.

The knowledge developed and transferred by the CNESST is codified, which means that it is explicit. The results take the form of a survey report including diagrams, calculations and normative data. In this regard, the materials used (paper, downloadable file, ...) by the CNESST to send the survey report to companies are judged satisfactory by these companies (45.2%) or very satisfactory (25.8%).

The availability and openness of the inspector-investigators is largely highlighted by the companies that responded to the questionnaire. Indeed, 64.5% consider that the inspector-investigators have demonstrated availability against 12.9%. Also, 52% of the companies consider that their concerns were taken into account against 29% who claimed to be dissatisfied.

As for the relevance of the transferred knowledge, it can be assessed through, on the one hand, the degree of adequacy of the recommendations in relation to the realities of the companies and, on the other hand, by their legitimacy. Thus, 61.3% of the companies feel satisfied or very satisfied with the recommendations made by the CNESST, against 9.7%. Another 61.1% find that the recommendations received are based on evidence, legal, technical, organizational and good practice standards in the area of OSH. 11.1% do not agree.

4.2.3 Receiving organizations

In terms of size (workforce), the majority of respondent firms (76%) are small and medium-sized enterprises. The remaining 24% are either large (13%) or very large (11%) companies. The sector of activities of these companies are mainly in buildings and construction (12.8%), forests and sawmills (12.8%), transportation and warehousing (10.6%) and metal manufactures (8.5%). Finally, 48.9% of companies report having one or more workers' unions in their midst.

Regarding the organization of OHS management, three of the four management mechanisms supported by the Act Respecting Occupational Health and Safety (OHSA) are used quite a bit by respondent companies. More specifically, the most used mechanism is the prevention program (86.8%), followed by the prevention representative (57.9%), and then the health and safety committee (47.37%). The settlement-specific health program is the least used mechanism (13.2%).

The vast majority of respondent companies have a policy in the area of OSH (78.90%), an information system on accidents or incidents that have occurred and statistics on occupational safety and health (76.3%), or a reception, training and information program for new OHS workers (68.4%). The fact that they are members of a prevention mutual (52.6%) and / or a joint sectoral association (31.6%) makes them benefit from the support of external collaborators in terms of advice and training in the field of OSH.

Finally, the "absorptive capacity" of firms, that is, their ability to recognize, assimilate and apply new external knowledge, has been significant. In fact, 55.6% of the companies state that they have had the resources (human, material, financial, etc.) required to apply the knowledge received from CNESST.

4.3 Influence of the legal obligations of the receiving company

Two legal obligations weigh on the companies surveyed by CNESST: to collaborate in the investigation and to implement the recommendations received.

4.3.1 Influence of the obligation to collaborate

The completion of all stages of the investigation requires collaboration between the companies and the CNESST inspector-investigators. The intensity of the collaboration varies according to the stages and according to the needs of the survey. According to the replies received, 81% of the companies claim to have collaborated with the CNESST by giving the inspector-investigators all the information and documents they needed and had requested. Only 3% of companies say the opposite. In return, 74% of the companies positively appreciated this collaboration. In fact, 45% felt they were satisfied and 29% were very satisfied with their level of involvement in the survey process.

4.3.2 Influence of the obligation to implement

66.7% of the companies stated that they had implemented the recommendations of the CNESST (the remaining 33.3%, did not answer). Of these, 87.5% confirm that they have applied between 75% and 100% of all recommendations.

Regarding the internal process that led to the application of the knowledge received, 69% of the companies that claim to have applied the transferred knowledge confirm that they intended to do so even before receiving the CNESST report. Also, nearly 64% say that they had the capacity to appropriate themselves the transferred knowledge after identifying what information seemed more useful to their needs (adoption).

In total, all the mechanisms and features described above are shown schematically in Figure 1.
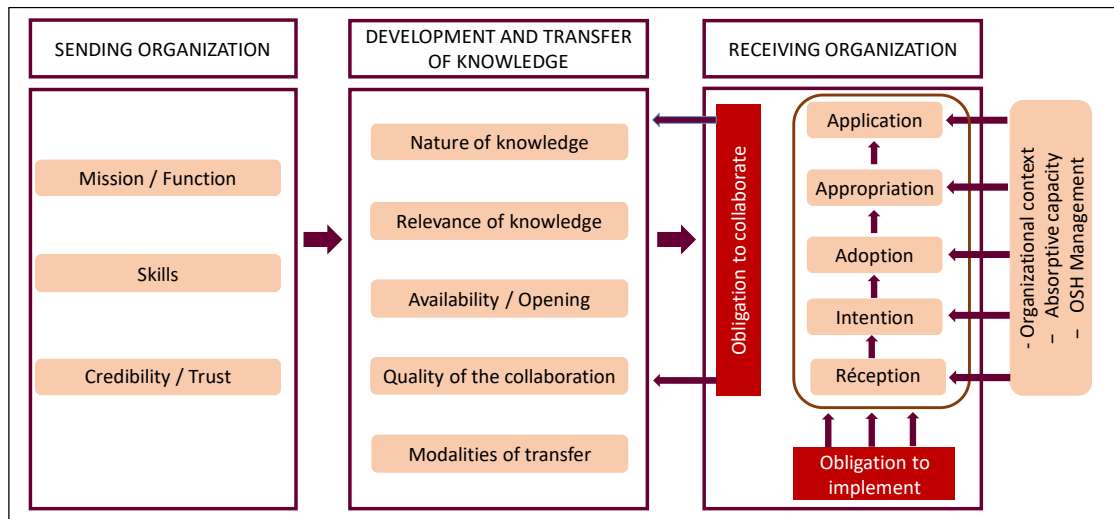
Figure 1: Overview of mechanisms and characteristics of inter-organizational knowledge transfer

5. Discussion

Methodologically, the overall response rate obtained, 85.5%, does not differ from those obtained by other researches using the online questionnaire survey method. For example, the study by Schulze et al (2014) had a response rate of 88%. Pineau and Slotswiner (2004), cited by Tuten (2010), point out that this method provides high response rates of up to 90%. The reason is simple: Participants who have all met the requirements have previously agreed to participate in the research. The main difficulty with this method is the smaller number of completed questionnaires. In fact, according to Ganassali and Moscarola (2004), online questionnaire surveys make it possible to obtain a return rate of 41.7% for questionnaires filled in completely.

The results obtained by the receiving companies in the implementation of the transferred knowledge can be explained by several reasons, some of which are related to the favorable organizational contexts, but also to external factors. Favorable organizational contexts include the existence of "absorptive capacity" (Cohen and Levinthal, 1990; Van Wijk, Jansen and Lyles, 2008), the organization of OHS management, and the presence of unions. External factors include the transmission capacity of the issuing organization, namely the CNESST. Indeed, according to Schulze et al (2014), the success of an inter-organizational transfer depends in part on the transmitter's ability to transmit. In the case of the CNESST, a team is mobilized behind the two inspectors-investigators to ensure the proper running of the survey, the reliability of the data and the quality of the report. Thus, over time, the CNESST has been able to develop real expertise in the field of workplace accident investigations.

The high level of application rate of transferred knowledge (87.5% of companies claim to have reached a level of application between 75% and 100%) cannot be explained solely by the tacit nature of the knowledge transferred (Argote et al, 2000), by the existence of favorable contexts, by the quality of the collaboration (Van Wijk, Jansen and Lyles, 2008), by the credibility of the issuing organization (Ko et al, 2005) or by the adequacy of transferred knowledge. It also results from the pressure of legal constraints, even if at this stage it is impossible to quantify the importance of this influence. Indeed, it is found that legal constraints influence the quality of

collaboration and encourage a greater application of transferred knowledge. This constitutes a fundamental point that differentiates the traditional models of inter-organizational knowledge transfer and the one operated by the CNESST.

6. Conclusion

The results of the research shed light on questions that have never or rarely been addressed: to identify the modalities through which inter-organizational knowledge transfers take place given the influence of two (2) constraining factors: the obligation to collaborate and the obligation to implement transferred knowledge. They made it possible to show that the inter-organizational transfer of knowledge from workplace accident investigations is different from the usual models of knowledge transfer. They also show that legal obligations to collaborate and implement transferred knowledge favorably influence the application of transferred knowledge.

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How Knowledge Management and Intellectual Capital Improve SMEs Planning Effectiveness

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Abstract: Nowadays knowledge represents an important strategic factor for business success. In fact, intangible resources often have a greater value than tangible ones and firms have to manage them adequately in order to reach their goals and gain competitive advantage. At the same time, knowledge management and intellectual capital are two strictly related concepts, meaning that the first is the "motor" of growth and of the latter. This is particularly true in the case of SMEs, considering that, due to a lack of physical and financial resources, their capability to reach their goals and be successful depends on the knowledge, experience and skills of the owner and his employees. However, SMEs seem to be disregarded, especially if the topics of knowledge management, intellectual capital and planning are linked. Therefore, this paper tries to answer the following two research questions: (RQ1) Does knowledge management practices impact on SMEs' intellectual capital? and (RQ2) Does intellectual capital impact on SMEs' planning effectiveness? To answer these questions we have created and empirically tested a conceptual model on a sample of 295 Italian SMEs using Consistent Partial Least Squares. Results clearly show that knowledge management practices have a positive direct impact on each component of intellectual capital. At the same time human, structural and relational capital have a significative direct impact on planning effectiveness. The main limitation of this study concerns the fact that it focuses only on Italian SMEs and thus, results cannot be generalized.

Keywords: SMEs, intellectual capital, knowledge management, planning effectiveness, PLSc

1. Introduction

In the knowledge-based economy, intangible resources, such as knowledge and intellectual capital (IC), play a key role in a firm's social and economic growth (Bontis et al., 2018) and they become a firm-specific successful factor to improve corporate performance and gain competitive advantage (Bontis, 1998; Edvinsson and Malone, 1997; Buenechea-Elberdin and Kianto, 2017). Therefore, the way knowledge and IC are managed could make the difference between failure or success. Empirical research suggests that knowledge management (KM) has a positive impact on organizational creativity (Lee *et al*, 2012), decision quality and speed (Giampaoli *et al*, 2017; Aureli *et al*, 2019), competitive advantage and, finally, financial performance (Tanriverdi, 2005). The impact that IC has on a firm's performance has been investigated for a long time with several studies reporting a positive impact of IC on a firm's performance (Inkinen, 2015). According to Cohen *et al*. (2014) IC encapsulate a firm's knowledge-based intangible assets which enhance a firm's responsiveness to business environment and its ability to implement strategy effectively.

Considering that knowledge is raw material used in the strategic decision-making process (Nonaka and Takeuchi, 1995; Ein-Dor, 2005) it is plausible to suppose that effective knowledge management practices and IC should lead to better decisions (Ragab and Arisha, 2013) and therefore better performance. Notwithstanding the growing interest in these topics, studies regarding KM and IC in Small and Medium-sized Enterprises (SMEs) are still limited (Hutchison and Quintas, 2008; Nunes et al, 2006; McAdam and Reid, 2001; Guthrie and Ricceri, 2010; Durst and Edvardsson, 2012). SMEs in Europe account for 99% of the total amount of operating enterprises and generate around 50% of total employment and up to 60% of added value (Patrice et al., 2014; European Commission, 2017), therefore it is absolutely necessary to analyze their peculiarity when it comes to KM and IC. Especially in the current social, political, and economic environment characterized by uncertainty and growing competition, knowledge and IC exploitation become a success factor for SMEs' survival and growth. Moreover, the impact of the last global economic crisis on international social and economic trends set the foundation of a change in the SMEs context for which decision-making is one of the most important managerial activities able to make the difference between success and failure (Litvaj and Stancekova, 2015). Therefore, this study tries to answer the following two research questions: (RQ1) Does knowledge management practices impact on SMEs' intellectual capital? and (RQ2) Does intellectual capital impact on SMEs' planning effectiveness? To test our hypotheses we developed and empirically tested a conceptual model on a sample of 295 Italian SMEs using structural equation modelling (SEM) based on consistent partial least squares (PLSc). Findings show that

knowledge management practices, positively and directly, impact on each intellectual capital component. Moreover, human, structural and relational capital have a positive direct impact on planning effectiveness. Finally, our results suggest that SMEs, should pay attention to the way they manage their knowledge and IC as they are key factors to enhance planning effectiveness.

2. Literature review

KM and IC are two strictly related concepts (Jardon and Martos, 2012), meaning that the first can be considered as the "motor" of growth and development of IC (Jordão and Novas, 2017). Consequently in order to understand better the dynamic between KM and IC, and the impact they have on a firm's performance, these elements should be analyzed together. Kianto et al (2014) developed four theoretical models showing the connections between IC, KM practices and a firm's performance. One of these conceptual models suggests that KM practices have a positive effect on a firm's performance and that this effect is positively mediated by IC. However, the authors do not provide empirical evidence and there is still a need to deeply understand and how KM and IC mutually drive a firm's performance (Cabrilo and Dhams, 2018). Even if a uniform understanding of knowledge still doesn't exist (Heisig, 2009), several definitions highlight the link between knowledge and decision-making: "*Knowledge is information that has been organized and analyzed to make it understandable and applicable to problem solving or decision-making*" (Turban, 1992); "*Knowledge is the raw material, work-in-process, byproduct, and final outcome of decision-making*" (Davenport and Holsapple, 2006). According to Gray (2001) knowledge is able to create value when it comes to solving problems and making decisions, allowing organizations to achieve their strategic goals.

A clear and effective definition of KM considers it as *''[a] conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organisational performance''* O'Dell et al. (1998). Their definition links together KM and corporate strategy. In fact, on one hand, KM is oriented towards improving corporate performance (Du Plessis, 2007; Kamara et al., 2002) and, on the other hand, KM contributes to strategy formulation, considering its key role in strategic decision-making, surely a very knowledge-intensive process (Holsapple, 2001). In other words, effective KM practices set up the foundation for planning effectiveness (PE), that is a firm's ability to reach its goals. Consequently knowledge management is one of the most important strategic factors for firms, as it is associated with a firm's ability to achieve competitive advantages (Teece, 2001) and it positively affects a firm's performance by the mediating role of IC components (Kianto et al., 2014).

This is particularly true for SMEs because very often their success depends on the knowledge, experience and skills of the owner and his employees rather than on physical and financial capital (Man et al, 2002) and, at the same time, they lack adequate resources to exploit their knowledge stock (Durst & Wilhelm, 2012). Knowledge management (KM) is able to support the transfer, storage and creation of knowledge-based resources in SMEs (Durst and Edvardsson, 2012), such as intellectual capital (IC) components. In line with Andreeva and Kianto (2012) in this paper KM is defined as a set of management activities that enable a firm's ability to deliver value from its knowledge assets and that can be consciously controlled by managers. These activities, if effectively implemented, enhance knowledge sharing within the organization that, in turn, increase company's ability to exploit value from IC (Kianto et al, 2014) and the quality of decisions made (Heisig et al., 2016). Giampaoli et al, (2017) identified several knowledge management practices useful for sharing knowledge and improving the quality of decisions made (e.g. work design, training, organizational culture, ICT, formalization and reward). Intellectual capital is an important resource that each organization needs to develop and manage in order to effectively implement corporate strategy, acquire and maintain a long-lasting competitive advantage and improve corporate performance (Chen et al., 2014; Riahi-Balkaoui, 2003; Bontis et al., 2018). Effective IC management can help managers to develop and allocate resources, facilitate decision-making and formulate strategy (Marr and Chatzkel, 2004; European Commission, 2006). According to Cohen et al. (2014) the better performing SMEs would rely on highly developed IC to counterbalance the effects of their smaller size. IC is seen as a valuable resource associated with SMEs' strategic orientation. Moreover, different firm's IC components lead to different strategies (Joia, 2000; Kumar, 2003; Rylander and Peppard, 2003). In other words, a firm's IC stock makes the shape of a firm's strategy. In fact, according to Tseng et al. (2013) intellectual capital highly affects business strategies, that, in turn, impacts on financial performance. Kuo-An Tseng et al., (2013) have found that the strategy formulation process can be enhanced by fully integrating IC into management models. Moreover, the positive impact that IC has on a firm's financial performance highlights its relation with corporate strategy as it enhances a firms' environmental responsiveness and its ability to implement strategy effectively

(Cohen, 2014). However, as underlined by Tseng et al. (2013) very few scholars have investigated the relationships among IC, business strategy and financial performance simultaneously.

Following Kianto et al. (2014) we define IC as "*the sum of all of the intangible and knowledge-related resources that an organization is able to use in its productive process in the attempt to create value*". Intellectual capital is commonly categorized into three main components such as human (HC), relational (RC) and structural capital (SC). More specifically, human capital seems to represent one of the key strategic resource for firms, since it refers to the knowledge embedded in employees' minds in terms of educational background, competence, experience, skills, creativity, innovativeness and problem-solving ability (Kianto et al, 2017; Inkinen, 2015; Youndt and Snell, 2004). Oh et al (2015) and Reed et al (2006) have found that HC positively impacts on a firm's performance in both small and large organizations. Samagaio and Rodrigues (2016) and Agostini e Nosella (2017) found similar results. However other researchers (Cabrilo and Dhams, 2018) have found a negative or even a non-significant direct effect between HC and performance.

Relational capital refers to a firm's relationship established with external stakeholders (Buenechea-Elberdin et al, 2018; Kianto et al, 2014). These inter-firm relationships create an effective network useful to gain and develop new resources, additional abilities, improve the cooperation amongst partners, share costs and risks, and improve a firm's performance (Buenechea-Elberdin et al, 2018; Agostini et al, 2017). Several empirical researches have found a positive and significant link between RC and a firms' performance in both large firms (Cabrilo and Dhams, 2018; Buenechea-Elberdin et al, 2018; Kianto et al, 2018) and SMEs (Agostini e Nosella. 2017; Gronum et al, 2012). SC involves all the tacit knowledge that lies in information systems, processes, routines and other structural arrangements (Inkinen, 2015; Khalique et al, 2018). In other words, SC can be considered as the sum of knowledge that stays within a firm when employees and managers have gone (Roos et al, 1998; Youndt & Snell, 2004).

Therefore, we hypothesized that:

> *H1: There is a positive direct relationship between KM practices and HC;*
>
> *H2: There is a positive direct relationship between KM practices and RC;*
>
> *H3: There is a positive direct relationship between KM practices and SC;*
>
> *H4: There is a positive direct relationship between HC and planning effectiveness (PE);*
>
> *H5: There is a positive direct relationship between RC and planning effectiveness (PE);*
>
> *H6: There is a positive direct relationship between SC and planning effectiveness (PE).*

The hypotheses are shown in Figure 1.
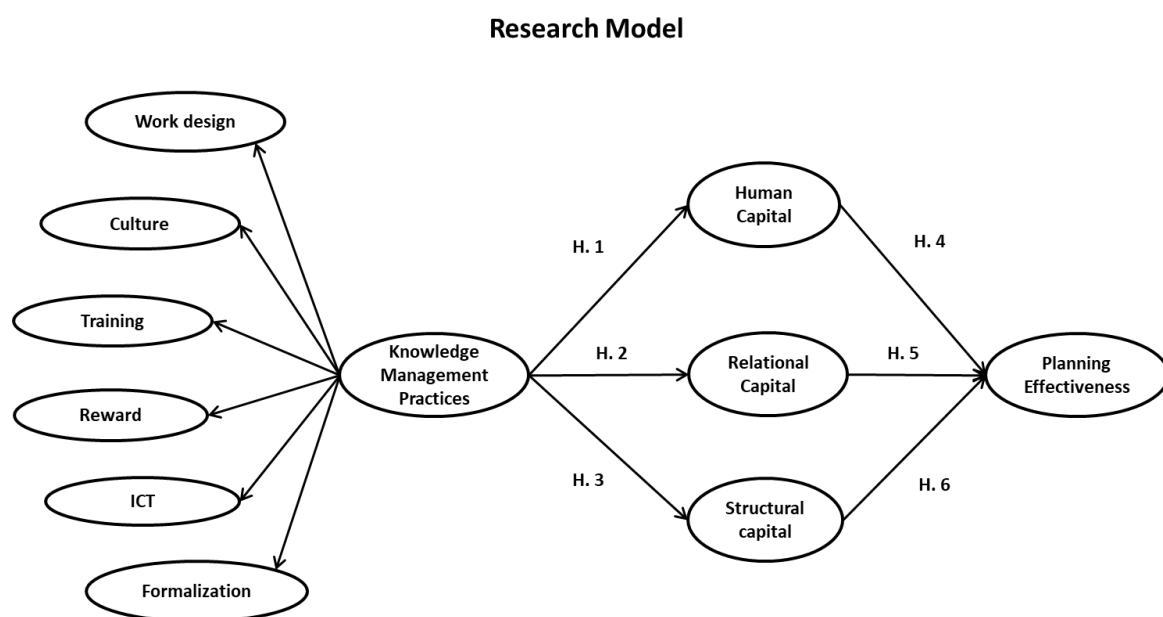
Research Model

Figure 1: Research model

3. Research methodology

3.1 Data collection, sample and survey development

We collected survey data from December 2018 to March 2019 from Italian SMEs. Considering the general low response rate of Italian firms we selected a random sample of 2000 SMEs from AIDA database using the following criteria: micro and SMEs (number of employees between 1 and 249) and located in Emilia-Romagna region (center Italy) where the economic context is mainly composed of SMEs. Out of 2000 firms, 295 took part in the research, representing about 15%. No questionnaires were excluded because they were all fully filled in. Approximately 72% of the respondents were top or middle managers while the remaining 28% covered a role of responsibility in strategy, finance, planning and control, human resource management or were managerial level employees. The main sectors represented were manufacturing (41%), other services (22%), commerce (12%) and construction (7%). The remaining 18% represented other sectors such as transportation, food service, etc. Approximately 2% of the firms employed up to 9 employees, 67% between 10 and 49, 31% between 50 and 249 employees.

3.2 Measures

The research model includes ten first-order constructs. However, we treated KM practices as a bundle and grouped them all in a second order construct. Scales were translated from English to Italian by one of the authors of the present paper and then translated back into English by another author to ensure correspondence between initial scales and survey questions. Finally an independent bilingual speaker checked both English and Italian scales finding them correspondent (Brislin, 1970). Scales for KM practices were taken or adapted from Lee and Choi (2003) and Giampaoli et al. (2017). Scales for IC were taken or adapted from previous work of Han and Li (2015), Kianto et al (2010) and Youndt and Snell (2004). Finally, planning effectiveness scale was taken from Elbanna and Elsharnouby (2018).

4. Results

4.1 Internal consistency reliability, convergent validity and divergent validity

We assessed the psychometric properties of scales in terms of reliability, convergent validity and discriminant validity. The reliability of the inherent variables and individual item is tested using Cronbach's Alpha ($\alpha \geq 0.7$) and Dillon-Goldstein's rho ($\rho \geq 0.7$) (Hair *et al*, 2010). Measurement scales have good convergent validity if the factor loadings of items on their corresponding constructs exceed 0.6 or if the AVE of the construct exceeds 0.5 (Hair et al, 2010). No items were dropped because all the factor loading are above the recommended threshold (Table 2) confirming that measurement scales have adequate convergent validity (Hair *et al*, 2010). We assess discriminant validity using Heterotrait-Monotrait Ratio (Table 3) (Henseler et al., 2015). According to the HTMT criterion, if the indicators of two constructs ξi and ξj have an HTMT value that is clearly smaller than one, the true correlation between the two constructs is most likely different from one, and therefore they should differ.

Table 1: Reliability and convergent validity

Reliability and convergent validity					
Inherent variables	Items	Loadings	Cronbach's alpha	Dillon-Goldstein rho	AVE
Work Design			0.884	0.884	0.718
	WD1	0.845			
	WD2	0.823			
	WD3	0.873			
Culture			0.849	0.849	0.653
	CUL1	0.870			
	CUL2	0.729			
	CUL3	0.819			
Training			0.884	0.885	0.720
	TR1	0.832			
	TR2	0.879			
	TR3	0.833			

Reliability and convergent validity					
Inherent variables	Items	Loadings	Cronbach's alpha	Dillon-Goldstein rho	AVE
Reward			0.891	0.891	0.731
	REW1	0.810			
	REW2	0.872			
	REW3	0.881			
ICT			0.922	0.922	0.799
	ICT1	0.947			
	ICT2	0.868			
	ICT3	0.864			
Formalization			0.886	0.887	0.726
	FORM1	0.969			
	FORM2	0.726			
	FORM3	0.845			
Human Capital			0.915	0.915	0.782
	HC1	0.864			
	HC2	0.898			
	HC3	0.890			
Relational Capital			0.954	0.954	0.874
	RC1	0.932			
	RC2	0.906			
	RC3	0.965			
Structural Capital			0.856	0.857	0.666
	SC1	0.829			
	SC2	0.790			
	SC5	0.829			
Planning Effectiveness			0.911	0.911	0.630
	PE1	0.755			
	PE2	0.803			
	PE3	0.826			
	PE4	0.812			
	PE5	0.782			
	PE6	0.784			

Table 2: Heterotrait-Monotrait Ratio (HTMT)

Heterotrait-Monotrait Ratio (HTMT)									
	CUL	FORM	HC	ICT	PE	RC	REW	SC	TR	WD
CUL									
FORM	0.338								
HC	0.579	0.386							
ICT	0.669	0.358	0.526						
PE	0.782	0.540	0.728	0.611					
RC	0.530	0.298	0.504	0.471	0.670				
REW	0.704	0.311	0.496	0.659	0.606	0.360			
SC	0.561	0.728	0.641	0.594	0.784	0.643	0.483		
TR	0.611	0.440	0.448	0.609	0.625	0.379	0.608	0.637	
WD	0.704	0.442	0.596	0.609	0.730	0.453	0.599	0.570	0.702

4.2 Testing of hypothesis

Data were analyzed using Consistent PLS (SMARTPLS – 3.2.4), a structural equation modeling technique widely used in studies investigating KM and IC impact on performance (Ragab and Arisha, 2013; Buenechea-Elberdin et al, 2018; Kianto et al, 2017). The sample size for performing PLS requires ten times the number of indicators associated with the most complex construct or the largest number of antecedent constructs linking to an endogenous construct (Hair *et al*, 2010). Therefore, the present research model would have been valid with 60 responses. We collected 295 responses and the final sample is adequate to test the structural model. Figure 2 shows the results of the structural model.

Test of the structural model

Notes: * p = 0.000; ** p = 0.001
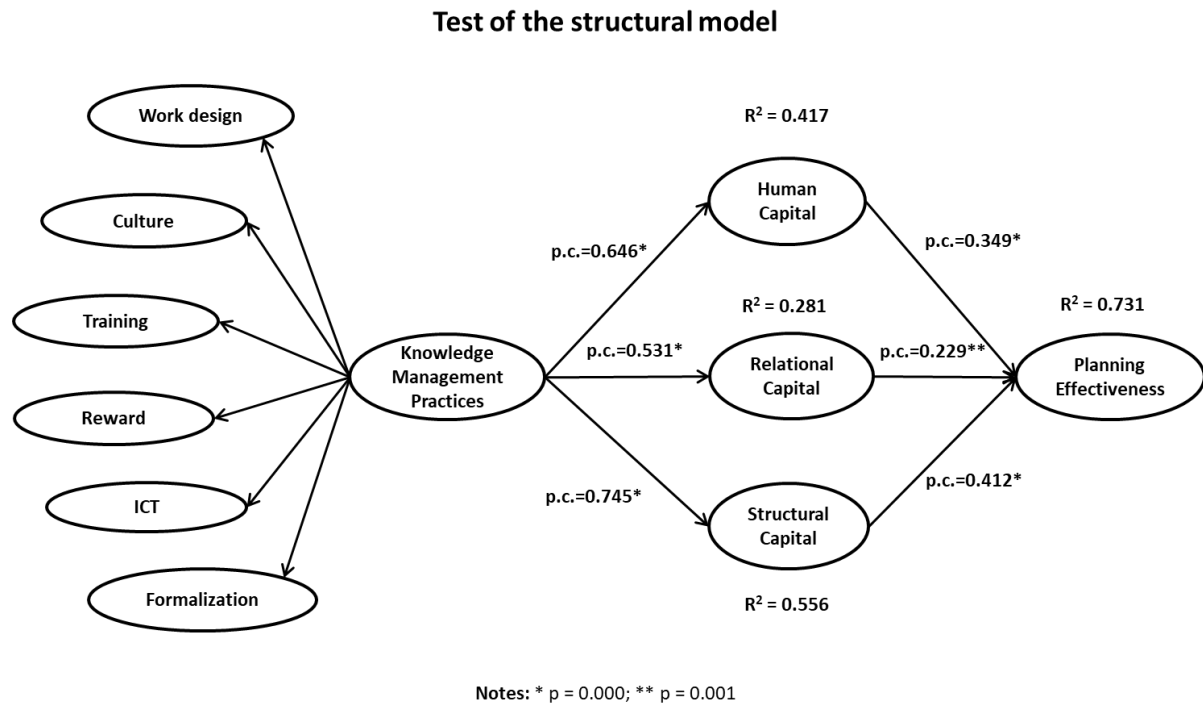
Figure 2: Test of structural model

5. Discussion and conclusion

The goal of the present paper is to provide empirical evidence of the complex linkage among KM, IC and planning effectiveness in the context of SMEs. We investigated the impact that KM practices have on each component of IC, that is human capital, relational and structural capital, and how these, in turn, impact on SMEs' planning effectiveness. We tested our hypotheses on a sample of 295 Italian SMEs using PLS-SEM.

We found good parameters for all latent variables: R^2 for HC =0.417, R^2 for RC =0.281, R^2 for SC =0.556 and finally, R^2 for Planning Effectiveness= 0.731.

With reference to the role of KM practices to enhance IC, our results confirm that effective KM practices are useful to enhance IC. As we hypothesized (H.1; H2; H3) KM practices have a positive impact on HC (β=0.646), RC (β=0.531) and on SC (β=0.556) confirming the assumption of Kianto et al. (2014) and Jordão & Novas, (2017), according to which KM represents the "driver" of growth and development of IC.

Regarding the importance of IC for planning effectiveness, our hypotheses (H4, H5, H6) are confirmed. We found that each IC component has has a positive direct impact on planning effectiveness (HC: β=0.349; RC: β=0.229 SC: β=0.412). It is very interesting to note that IC is able to explain a great amount of variance of planning effectiveness (0.731). This highlight the importance that KM and IC have in helping managers to make effective decisions and reach their strategic goals. This could be considered as one of the most important benefit of intangible resources, especially for SMEs. In fact, they generally lack financial and physical resources, and so their success depends on the knowledge and skills of the owner and his employees.

Overall, results confirm that KM and IC have to be analyzed together if we intend to better understand the dynamic between KM and IC, and the benefits they are able to provide in terms of a firm's performance. At the same time results confirm the importance that KM and IC have on SMEs and the need to find the best way to manage and take advantage of them. Knowledge and IC represent important resources able to enhance planning effectiveness and SMEs need to manage them in the best possible way. Therefore SMEs managers and entrepreneurs should invest in KM practices in order to perform their IC effectively.

Finally it is worth nothing that SC is able to greatly benefit from KM practices and, at the same time, to have a very strong positive direct impact on planning effectiveness. Considering that SC is the only component of IC that a firm can control, SMEs should invest in its development. The main limitation of this study is the generalizability of results given that data was collected from SMEs of one single European country.

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A Critical Analysis of Scientific Productivity of the 'Human Resource Management' Research in Select Countries

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Abstract: Human Resource Management (HRM) is the process of proper and maximum utilization of available limited skilled workforce. The core purpose of HRM is to make efficient use of existing human resource in the organization. This paper attempts to assess the literary output in HRM productivity for a period of ten years i.e. (2009-2018).The data was collected using the Scopus database which retrieved a total of 12622 records. The study reveals that the publications have an increasing tendency with 703 (5.57%) publications for the year 2009 and 1535 (12.16%) publications for the year 2018. However, the relative growth rate (RGR) shows a decreasing trend from 0.80 to 0.13 while as the doubling time (Dt.) indicates an increasing trends from (0.87 to 5.34). For 12622 publications, a total of 92624 citations were recorded with an average degree of author collaboration amounting to 0.80; modified collaboration coefficient of 0.51, and a collaborative index of 2.65. Maximum (10039) papers are a collaborative effort of multiple authors with 2583 publications having single authors. Brewster, C. from Henley Business School, Henley-on-Thames, United Kingdom is the most productive author with 41 publications with h-index of 39 and a total citation count of 4934. Researchers prefer to publish their research result in academic journals and the maximum 5893 (46.68%) records are of "Article" type with 4953 records reflecting "Business, Management and Accounting" subject area. The most productive institution appears "Monash University" with 132 publications while the most popular funding agency was "National Natural Science Foundation of China" with 296 publications. "International Journal of Human Resource Management" appears as the most productive journal with 372 publications while "Human Resource Management" has the highest keyword frequency of 9289. The United States (U.S.A) is the most productive country with 31% of total publication count, while the maximum 12225 (96.85%) publications in the English language during the period of study.

Keywords: scientometrics, human resource management, relative growth rate and doubling time, degree of author collaboration, modified collaboration coefficient and collaborative index of authorship pattern

1. Introduction

The present study can be categorised as descriptive and evaluative. Descriptive studies deal with the number of publications in a given field or publication of records in the particular field for the purpose of comparing the amount of research in different nations, the amount produced during different periods or the amount produced in different sub-divisions of the field. Research papers are the carriers of information, journals are the communication channels, and bibliographical references represent the effect of past research on the development of information flow. Human Resource Management has three parts (1) Human: refers to the skilled workforce in the organisation/institutions. (2) Resource: refers to limited availability and (3) Management: refers how to optimize and make the best use of such limited resource so as to meet the organisation/institutions goals and objectives. According to Youndt et al, (1996) the human resource and human resource management as following, "human resource (HR) activities are frequently acknowledged to play a central role in linking employee capabilities with the performance requirements of a firm, the specific form of this relationship is still open to debate. To date, two primary perspectives—a universal approach and a contingency approach—have been used to describe the link between human resource management (HRM) and firm performance. The universal, or "best practices," perspective implies a direct relationship between particular approaches to human resources and performance, and the contingency perspective posits that an organization's strategic posture either augments or diminishes the impact of HR practices on performance. Analytically, this distinction has been operationally denned as main effects for the universal perspective and as interaction (or moderation) effects for the contingency perspective."

Scientometrics is a very important measurement tool for the assessment of scientific production. Scientometrics is the most dependable approaches to follow science and technology activities are the investigation of scientific publications. The recent couple of year scientometric investigation has been progressively used to assess the research performance of scientists and the development of different disciplines of sciences. It is especially analysis the trends of the growth rate of publications and citations, authorship pattern, institutions

productivities, the degree of authors collaboration pattern and relative growth rate and doubling time, Modified collaboration coefficient, collaborative index and so on.

2. Literature review

Gupta and Dhawan (2018) carried out a scientometric analysis of artificial intelligence research in India from the marked period (2007-2016). The annual average growth rate was (27.45%) recorded, and average citation (2.76 each paper) were found during the period of study. The highest (86.99%) of research papers were published in the field of computer science subject, followed by engineering subject filed with (30.69%) while the most productive institution name was Anna University, Chennai with 294 contributions; and 761 citations and S. Das was most prolific author with 36 publications, followed by B. K. Panigrahi, IIT Delhi with 32 contributions.

Kumar and Kaliyaperumal (2015) investigated a scientometric study in mobile technology research literature from (2000-2013). Web of Science database was the source where the primary data were collected and a total 10638 of records were published and the average publications per year were (759.86) recorded while the maximum 1495 of research papers came in 2013. The most prolific author was Kim with 42 publications and collaboration Index ranges was found from (3.67) in the year 2000 to (4.57) in 2009 with an average (4.32) of each two authored publications. The highest 243 records were contributed by the University of California System (USA) from the marked period of study.

Majid et al (2015) conducted a bibliometric study in publishing trends in information literacy literature during the period (2003-2012). A total of 1989 records were found from the marked period of study. Large numbers of 347 records were published in the year 2011, followed by 336 records were published in 2012. The maximum publications were contributed by more than a single author. The most prolific author was Julien, H. with 18 publications while large numbers of 23 records were contributed by University de Granada, followed by 22 research papers each published by University of Sheffield and University of Alberta. A large number of 1585 records were published in a social science subject area, followed by computer science subject area with 453 publications. A large number (942) of publications were contributed by the United States scientist.

Selvi and Dhanavandan (2014) carried out a scientometric analysis on research output and literature growth of information literacy (1919-2013). The primary data for analysis was collected by the Scopus database out of a total of 10254 records, large numbers of 1379 records were published in the year 2013. The highest 4292 (41.85%) of research papers were published by the United States, followed by the United Kingdom with 815 (7.94%) research papers contributed and in the social sciences subject are the maximum number of records (4841) came while the highest 6799 (66.3%) of research papers were article type document. Wolf, M.S was the most prolific author with 52 (0.5%) of contributions. Large numbers of 74 publications were contributed by VA Medical Center from the marked period of study.

Kumar (2014) conducted a scientometric analysis in digital literacy in online library information science and technology abstracts (LISTA) during (1997-2011). Out of a total 137 records, large numbers of 75 (54.74%) research papers were published in the 2009-2011 time period and the maximum 73 (53.28%) of records were published in education subject field. The highest 95 (69.34%) of research papers were published in an academic journal while a large numbers 48 (35.04%) of publications were contributed by three authors, followed by two authors with 43 (31.39%) of publications during the period of study.

3. Objectives of the study

The main objectives of the study are:

- Analysis of the year-wise distribution of publications and citations in HRM research.
- Examine the Degree of Author Collaborations.
- Analysis of the Relative Growth Rate (RGR) and Doubling Time (Dt) of the publications.
- Identify the Modified Collaboration Coefficient and Collaborative Index of the authors.
- Examine the geographical distributions of publications.
- Identify the language-wise distribution of publications.

4. Methodology and scope

The data were gathered using the indexing/abstracting database of Elsevier, *Scopus*. The data were refined for a period of 10 years for the subject Human Resource Management and further refinement was ascertained on the basis of top 10 contributing nations (United States, China, United Kingdom, Australia, Germany, Canada, Spain, India, Malaysia, and France). Publications indexed as final ones were only included. The following search string was executed for extracting the data: ("Human Resource Management") AND (LIMIT-TO (PUBYEAR,2009) TO (PUBYEAR,2018)) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (AFFILCOUNTRY, "United States") OR LIMIT-TO (AFFILCOUNTRY, "China") OR LIMIT-TO (AFFILCOUNTRY, "United Kingdom") OR LIMIT-TO (AFFILCOUNTRY, "Australia") OR LIMIT-TO (AFFILCOUNTRY, "Germany") OR LIMIT-TO (AFFILCOUNTRY, "Canada") OR LIMIT-TO (AFFILCOUNTRY, "Spain") OR LIMIT-TO (AFFILCOUNTRY, "India") OR LIMIT-TO (AFFILCOUNTRY, "Malaysia") OR LIMIT-TO (AFFILCOUNTRY, "France"))), which retrieved a total of 12622 records (as on 12/09/2019). These records along with full bibliographical were recorded and tabulated in MS Excel and tested by the various scientometric indicators to achieve the desired objectives.

5. Data analysis

5.1 Year-wise distribution of publications and citations

In the year-wise distribution of the publication, the maximum number of publications 1535 (12.16%) are published in the year 2018 followed by 1509 (11.96%) of records were published in 2016 while the minimum 703 (5.57%) of research papers were published in the beginning year of the study i.e. 2009. However, the maximum 12352 (13.34%) of citations were recorded in 2013, followed by 12040 (13%) of citations were recorded in 2011 and the minimum 2331 (2.52%) of citations have been found in the last year of the study i.e. 2018. The overall data of the year-wise distribution of publications and citations as shown below (Table 1).

Table 1: Year-wise distribution of publications and citations

Year	No. of publications	% of publications	Citations	% of Citations
2009	703	5.57	11772	12.71
2010	862	6.83	10256	11.07
2011	1124	8.91	12040	13.00
2012	1093	8.66	11640	12.57
2013	1388	11.00	12352	13.34
2014	1505	11.92	10040	10.84
2015	1422	11.27	9710	10.48
2016	1509	11.96	7459	8.05
2017	1481	11.73	5024	5.42
2018	1535	12.16	2331	2.52
Total	**12622**	**100.00**	**92624**	**100.00**

The overall publications have been shown in increasing trend while their citations was shown in decreasing trend .The latest publications came later and hence didn't receive so much citations whereas the older publications were read many times and cited by many scientists that is large number of citations were found.

5.2 Relative growth rate and doubling time of publications in HRM research

Relative growth and doubling time of publications, the maximum relative growth was (0.80) recorded in the year 2010, followed by (0.54) relative growth in 2011 while the minimum (0.13) relative growth was recorded in the last year of study i.e. 2018. However, the maximum (5.34) doubling time was found in the ending year of the study i.e. 2018, followed by (4.83) doubling time in the year 2017 and the minimum (0.87) doubling time was recorded in 2010. The relative growth rate has been shown in a decreasing trend (0.80 to 0.13) while the doubling time has been found in increasing trends i.e. (0.87 to 5.34) during the period of study. The growth rate of whole contributions has been measured on the basis of RGR and Dt model, which is developed by Mahapatra in 1985. The mathematical representation of the mean relative growth rate of articles over a specific period is derived from the following formula:

$$RGR = \frac{W2 - W1}{T2 - T1}$$

"**RGR** = Growth Rate over the specific period of the interval

W1 = Log$_e$ (natural log of the initial number of contributions)
W2 = Log$_e$ (natural log of the final number of contributions)
T1 = the unit of initial time
T2 = the unit of the final time"

Doubling Time

From the calculation, it is identified that there is a direct equivalence existing between the RGR and Dt. If the number of contributions of a subject double during a given period, then the difference between the logarithm of the numbers at the beginning and at the end of the period must be the logarithms of the number 2. If one uses a natural logarithm, this difference has a value of 0.693 (Beaie and Acol, 2009)**.**

The following formula used to analysis the doubling time.

$$Doubling Time(Dt) = \frac{0.693}{R}$$

Table 2: Relative growth rate and doubling time of publications in HRM research

Year	No. of Publications	Cumulative Sum	W1	W2	RGR	Dt
2009	703	703	0	6.56	0	0
2010	862	1565	6.56	7.36	0.80	0.87
2011	1124	2689	7.36	7.90	0.54	1.28
2012	1093	3782	7.90	8.24	0.34	2.03
2013	1388	5170	8.24	8.55	0.31	2.22
2014	1505	6675	8.55	8.81	0.26	2.71
2015	1422	8097	8.81	9.00	0.19	3.59
2016	1509	9606	9.00	9.17	0.17	4.06
2017	1481	11087	9.17	9.31	0.14	4.83
2018	1535	12622	9.31	9.44	0.13	5.34

The relative growth rate (RGR) shows the growth rate of contribution by the researchers. RGR is increasing in number of publications or pages per unit of time while Doubling time indicator is used for evaluating the growth rate of papers published. There is a direct equivalence that exists between the RGR and DT.

5.3 Degree of author's collaborations

The degree of authors collaborations, the maximum 10039 of records were contributed by multiple authors while the rest were 2583 of records were published by single authors. The maximum (0.84) degree of authors collaboration was recorded in the year 2017 whiles the minimum (0.71) DC was recorded at the beginning of the study i.e. (2009). The average degree of authors collaboration was (0.80) recorded during the period of study. The degree of author collaboration clearly shows its dominance on multiple author contributions. (K. Subramanyam, 1983) has given the DC formula to determine the degree of author collaboration in quantitative terms. The following formula is used to analyse the degree of authors' collaborations.

$$DC = \frac{Nm}{Nm + Ns}$$

Table 3: Degree of authors collaborations

Year	Single Authored Publications (Ns)	Multiple Authored Publications (Nm)	Degree of Collaboration (DC)= Nm/(Nm+Ns)
2009	201	502	0.71
2010	190	672	0.78
2011	291	833	0.74
2012	234	859	0.79
2013	292	1096	0.79
2014	369	1136	0.75

Year	Single Authored Publications (Ns)	Multiple Authored Publications (Nm)	Degree of Collaboration (DC)= Nm/(Nm+Ns)
2015	246	1176	0.83
2016	264	1245	0.83
2017	241	1240	0.84
2018	255	1280	0.83
Total/Avg.	**2583**	**10039**	**0.80**

The degree of collaboration provided the collaboration between single authored paper and multiple authored paper

5.4 Year-wise authorship pattern; modified collaboration coefficient (MCC) and collaborative index (CI)

In authorship pattern, modified collaboration coefficient and collaborative index, the maximum 3763 of research papers were contributed by joint authors, followed by three authors with 3172 of publications; single authors contributed 2583 of publications; four authors contributed 1691 of records while more than four authors contributed 1413 of research papers. However, the maximum (0.55) of modified collaboration coefficient was recorded in the years 2017 and 2018, followed by (0.54) of modified collaboration coefficient was found in 2015 and the average modified collaboration coefficient was (0.51) recorded from the marked period of study. However, the highest (2.93) collaborative index was found in 2018, followed by (2.87) collaborative index in 2017 and the average collaborative index (2.65) was recorded during the period of study. The overall modified collaboration coefficient and the collaborative index has been shown in fluctuating trends while the overall data of year-wise authorship pattern, modified collaboration coefficient and the collaborative index has been shown in below (Table 4).

Modified collaboration coefficient

The new measuring technique is MCC given by (Ajiferuke, Burrel and Tague, 1988). In this indicator, it is found that if a paper has a single author, the author receives one credit, with two authors, each receives ½. MCC value lies between 0 and 1. Since 0 to correspond to single authorship, define the MCC.

$$\text{MCC} = \left(\frac{N}{N-1}\right)\left\{1 - \frac{\sum_{j=1}^{A}\left(\frac{1}{j}\right)fj}{N}\right\}$$

Collaborative Index

Collaborative index formula is given by (Lawani, 1980). CI is a calculate of the average number of authors per paper, it has no upper limit and can't be expressed as a (%). Single authored publications give a non-zero, which involve no collaboration. The collaborative index is defined as (CI), recreate as:

$$\text{CI} = \frac{\sum_{j=1}^{A} jfj}{N}$$

Where,
j = the number authors in an article i.e. 1, 2, 3, 4, more than 4.
fj = the number of j authored articles
N = the total number of articles published, and A = the total number of authors per articles.

Table 4: Year-wise authorship pattern; modified collaboration coefficient (MCC) and collaborative Index (CI)

Year	Single Author	Joint Authors	Three Authors	Four Authors	More than Four authors	Total	Modified Collaboration Coefficient (MCC)	Collaborative Index (CI)
2009	201	245	149	65	43	703	0.43	2.29
2010	190	354	200	71	47	862	0.47	2.34
2011	291	372	262	110	89	1124	0.46	2.41

Year	Single Author	Joint Authors	Three Authors	Four Authors	More than Four authors	Total	Modified Collaboration Coefficient (MCC)	Collaborative Index (CI)
2012	234	365	277	123	94	1093	0.49	2.52
2013	292	437	340	173	146	1388	0.50	2.60
2014	369	431	361	197	147	1505	0.48	2.55
2015	246	374	401	218	183	1422	0.54	2.80
2016	264	423	406	225	191	1509	0.53	2.77
2017	241	404	372	232	232	1481	0.55	2.87
2018	255	358	404	277	241	1535	0.55	2.93
Total/Avg.	2583	3763	3172	1691	1413	12622	0.51	2.65

The average MCC and CI is recorded (0.51) and (2.65) respectively. It has also been observed that both the MCC and CI were shown in increasing trend.

5.5 Scientific profile of the top 10 most productive authors in HRM research

Brewster, C. from Henley Business School, Henley-on-Thames, the United Kingdom was the most productive authors, contributed 41 publications; and his h-index was 39; a total citations 4934, followed by Bartram, T. from RMIT University, School of Management, Melbourne, Australia with 29 publications; h-index 21; a total citations 1508 and Wilkinson, A. from Griffith University, Brisbane, Australia with 26 contributions; h-index was 38; and a total citations received 4837. The overall data of the scientific profile of the top 10 most productive authors in human resource management research was given below (Table 5).

Table 5: Scientific profile of the top 10 most productive authors in HRM research

Author's Name	Affiliation	No. of publications	h-index	Total citations
Brewster, C.	Henley Business School, Henley-on-Thames, United Kingdom	41	39	4934
Bartram, T.	RMIT University, School of Management, Melbourne, Australia	29	21	1508
Wilkinson, A.	Griffith University, Brisbane, Australia	26	38	4837
Cooke, F.L.	Monash University, Melbourne, Australia	22	27	2280
Wright, P.M.	The University of South Carolina, Columbia, United States	22	41	11953
Stanton, P.	RMIT University, School of Management, Melbourne, Australia	20	18	979
Warner, M.	University of Cambridge, Cambridge, United Kingdom	20	34	3470
Aguinis, H.	George Washington University, Washington, D.C., United States	19	49	9129
Budhwar, P.	Aston Business School, Birmingham, United Kingdom	19	40	4968
Zheng, C.	Deakin University, Geelong, Australia	19	13	470

The most productive country is United Kingdom and Brewster, C. is the most prolific contributors in the field of human resource management.

5.6 Document-wise distribution of publications

Document wise distribution of publications shows that the maximum 5892 (46.68%) of records were 'Article' type documents, followed by 'Conference paper' type documents with 5410 (42.86%) of publications and 592 (4.69%) of records were 'Book chapter' type documents. The whole data of document wise distribution of publications has been shown below (Table 6).

Table 6: Document-wise distribution of publications

Type of documents	No. of publications	% of publications
Article	5892	46.68
Conference Paper	5410	42.86

Type of documents	No. of publications	% of publications
Book Chapter	592	4.69
Review	320	2.54
Book	269	2.13
Editorial	65	0.51
Retracted	41	0.32
Note	17	0.13
Short Survey	10	0.08
Erratum	4	0.03
Letter	2	0.02
Total	**12622**	**100.00**

The most of the scientists were very much interested to publish their research results in journals that is why the maximum records were article type documents.

5.7 Subject areas wise distribution of publications in HRM research

The subject areas wise distribution of the publication in human resource management shows that the maximum 4953 records were published in the field of Business, Management and Accounting, followed by engineering subject field with 4048 publications and Computer Science subject field have published 3319 records. The overall data of subject areas wise distribution of publications in human resource management research has been shown below (Table 7).

Table 7: Subject areas wise distribution of publications in HRM research

Subject Areas	Frequency of publications	Subject Areas	Frequency of publications
Business, Management and Accounting	4953	Arts and Humanities	245
Engineering	4048	Agricultural and Biological Sciences	217
Computer Science	3319	Chemical Engineering	206
Social Sciences	1929	Chemistry	144
Decision Sciences	995	Health Professions	117
Economics, Econometrics and Finance	914	Biochemistry, Genetics and Molecular Biology	72
Mathematics	759	Nursing	60
Environmental Science	575	Multidisciplinary	51
Psychology	572	Pharmacology, Toxicology and Pharmaceutics	26
Energy	541	Neuroscience	16
Earth and Planetary Sciences	505	Veterinary	5
Medicine	494	Dentistry	2
Materials Science	296	Immunology and Microbiology	2
Physics and Astronomy	259		

Maximum numbers of publications were published in the areas like Business, Management and Accounting scientists because the said area of research is related to the particular field of research.

5.8 Significant source title and keywords in HRM research

On the observation of the particular table 8, it has been found that the highest 372 of research papers were published in 'International Journal Of Human Resource Management', followed by 'Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics' with 162 contributions in HRM research and 'ASEE Annual Conference And Exposition Conference Proceedings' published 145 research papers. However, the frequency of 'Human Resource Management' keyword is very high with 9289, followed by 'Project Management' keyword with 991 frequencies and 'Information Management' keyword frequency was 965 during the period of study. The whole data of significant source title and keywords in human resource management research is shown below (Table 8).

Table 8: Significant source title and keywords in HRM research

Source Title	Frequency of publications	Keywords	Frequency of keywords
International Journal Of Human Resource Management	372	Human Resource Management	9289
Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics	162	Project Management	991
ASEE Annual Conference And Exposition Conference Proceedings	145	Information Management	965
Applied Mechanics And Materials	141	Managers	714
Human Resource Management	115	Knowledge Management	703
Advanced Materials Research	107	Personnel Training	593
Human Resource Management Review	92	Decision Making	573
ACM International Conference Proceeding Series	91	Surveys	527
Advances In Intelligent Systems And Computing	84	Human	520
Personnel Review	76	Industry	520

The International Journal of Human Resource Management is the most preferable journal among the scientists while the most common keyword was Human Resource Management.

5.9 Top 10 most productive affiliations and sponsor body in HRM research

The Monash University was the most productive university with 132 contributions in HRM research, followed by Griffith University with 108 publications and University of New South Wales UNSW Australia with 103 publications while the most famous sponsor body was 'National Natural Science Foundation of China' with 296 publications, followed by 'National Science Foundation' with 123 publications and 'Economic and Social Research Council' with 39 publications sponsored during the period of study. The whole data of the top 10 most productive affiliations and sponsor body in human resource management research is shown below (Table 9).

Table 9: Top 10 most productive affiliations and funding sponsor in HRM research

Affiliations Name	No. of publications	Sponsor body	No. of publications
Monash University	132	National Natural Science Foundation of China	296
Griffith University	108	National Science Foundation	123
University of New South Wales UNSW Australia	103	Economic and Social Research Council	39
RMIT University	86	European Commission	39
Pennsylvania State University	85	Australian Research Council	36
University of South Australia	81	Engineering and Physical Sciences Research Council	36
Tsinghua University	75	Fundamental Research Funds for the Central Universities	35
University of Manchester	67	Social Sciences and Humanities Research Council of Canada	34
Curtin University	67	Natural Sciences and Engineering Research Council of Canada	29
La Trobe University	64	Office of Naval Research	27

The most productive university is Monash University, their scientists published maximum numbers of publication in human resource management research.

5.10 Country-wise distribution of publications

The country-wise distribution of publications reveals that the maximum 31% of publications were contributed by the United States, followed by China with 18% of records and the United Kingdom published 13% of research

papers on human resource management research during the period of study. The overall data of top ten country-wise distributions of publications was shown in below (Table 10).

Table 10: Countries-wise distribution of publications

Country Name	% of publications
United States	31%
China	18%
United Kingdom	13%
Australia	8%
Germany	7%
Canada	5%
Spain	5%
India	5%
Malaysia	4%
France	4%
Total (%)	**100%**

United States is the highest contributor in the world as far as HRM topic is concerned.

5.11 Language-wise distribution of publications

In language-wise distribution of publication depicts that the maximum 12225 (96.85%) of research papers was available in 'English' language, followed by 'Chinese' language with 175 (1.39%) of publications and 'German' language publications was 85 (0.67%); 'Spanish' language 76 (0.60%); 'French' language with 51 (0.40%) of publications; 'Portuguese' with 6 (0.05%) of publications; 'Russian' language with 3 (0.02%) of records; and 'Ukrainian' language with 1 (0.01%) of publications during the period of study.

Table 11: Language-wise distribution of publications

Language	No. of publications	% of publications
English	12225	96.85
Chinese	175	1.39
German	85	0.67
Spanish	76	0.60
French	51	0.40
Portuguese	6	0.05
Russian	3	0.02
Ukrainian	1	0.01
Total	**12622**	**100.00**

6. Conclusion

The scientometric study is increasingly used for research assessment. Major research issues include the measurement of the impact of research papers and academic journals, the understanding of scientific productivity, and the use of such measurements in policy and management contexts. The purpose of the present scientometric study is to analyze research productivity in the field of human resource management research during the period of 10 years i.e. (2009-2018). On the observation of the primary data which was downloaded by the Scopus database, it has been found that the overall publications have been shown in increasing trend but in the years of 2012, 2015, 2017 the frequency of publications is down and a total 92624 citations were recorded on 12622 publications during the period of study. The overall relative growth rate was shown in decreasing trend while the doubling time has been shown in an increasing trend. The degree of author's collaboration was clearly shown its dominance on multiple authors' contribution and the average degree of authors' collaboration was (0.80) recorded from the marked period of study. The average modified collaboration coefficient and collaborative index were (0.51) and (2.65) found respectively. The most productive author was Brewster, C. from Henley Business School, Henley-on-Thames, United Kingdom with 41 publications; 39 h-index; and 4934 total

citations, followed by Bartram, T. from RMIT University, School of Management, Melbourne, Australia with 29 publications; 21 h-index; and a total citations was 1508 recorded out of a total ten most productive authors, a maximum 5 authors came from Australia. However, large numbers of 5892 (46.68%) of records were found 'Article' type documents, followed by 'Conference paper' type document with 5410 (42.86%) of records were found, these two types of the document were cover 11302 (89.54%) of publications. Business, Management and Accounting subject cover 4953 publications while the highest 372 of publication source title was 'International Journal Of Human Resource Management' and the maximum 'Human Resource Management' was found 9289 keyword frequency. Monash University was the most productive institution with 132 of publications contribution while the maximum 296 publications were funded by 'National Natural Science Foundation of China'. A large 31% of research papers were contributed by the United States and the highest 12225 (96.85%) of records were published in 'English' language during the period of study.

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Universities as Smart Organization and Green Innovation Strategy: A Theoretical Framework for North Cyprus

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Abstract: The aim of this study is to identify the features of smart organizations based on green innovation strategy. Both the structure of smart organizations and the culture of smart organizations will be investigated theoretically from the green innovation strategy perspective of this study because of sustainable development. Universities have a capability for understanding the features of smart organizations in the context of energy consumption efficiency. The transformation of the Universities to the smart organizations' context, theoretical assumptions has been developed. What factors and concepts should be considered in this transformation process have emphasized in this study. Northern Cyprus case could be reflected on the energy consumption efficiency based on the Universities. Exploratory research will be applied from this study in the future in order to understand how Northern Cyprus Universities have a capability of representing the features of smart organizations and how their green innovation strategy should be followed by top managers.

Keywords: smart organization, green innovation strategy, universities, North Cyprus, sustainability development

1. Introduction

Smart organizations aim to sustain their life in a highly competitive environment by following the green innovation strategy in the digital age. In parallel of rapidly increasing the importance of Artificial Intelligence studies in the world; "internet of things", "industry 4.0" are some of the concepts which are still inexplicit in the literature in the context of green innovation strategy.

Energy is an essential need for the survival of human beings. Restrictions on energy resources that can be effectively exploited to meet these needs remain. Therefore, today universities and governments are dealing with many important problems related to energy usage. If the energy resources are not sufficient, these sources, which are supplied from other countries, become an economic burden. On the other hand, since the end of the twentieth century, the idea of sustainable development that has gained importance throughout the world has come to the forefront. The development of new environmentally friendly technologies, products and services has started to be seen as one of the main tools for corporations. In addition, in recent years, more efficient use of energy resources, climate change, global warming and environmental destruction have been at the top of the world's agenda.

Within the scope of another development that has been taking place worldwide in the recent period, information and communication technologies are located in almost all areas of social life and exist effectively in the living area. In this context, information and communication technologies play an important role in achieving sustainable goals.

Smart technologies are an important tool in solving problems in various sectors such as environment, transportation, energy, construction, meeting new needs and making them more effective (Karagöl, 2013). The concept of green informatics has come to the forefront with the integration of smart organizations and green innovation concepts.

The concept of green informatics in the context of environmental sustainability encompasses the use of smart organizations that consume less energy and thus cause less harm to the environment in reducing the negative impact on the environment in their services. The most important areas for increasing energy efficiency with smart technology are industry, transportation, buildings and energy sectors, which are also the sectors where energy consumption is realized most. With the intensive and widespread use of smart technologies in these sectors, innovative applications such as smart production systems, smart transportation systems, smart building systems and smart electricity networks emerge (OECD, 2010).

In this way, the importance of green informatics in these sectors is increasing while environmental pollutions are decreasing. In addition, green innovation solutions and practices provide sustainable opportunities for universities that have made progress in their development and production.

In this framework, this study aims at reviewing the literature theoretically and gives recommendations for the universities in the TRNC to benefit from these applications by considering the potential benefits of green technologies and green universities. TRNC is one the most popular countries for the university in the world. Approximately 33 universities are there in the island and 28.50% of the populations are university students. Not only smart technologies but also green innovation and green informatics should be considered by managing of these universities in the island in order to survive environmental sustainability. This study recommends a conceptual model for the Universities in the TRNC to protect both environmental pollution and environmental damage (e-waste).

2. The integration of smart organizations with green innovation

Along with the concept of green growth that emerged in line with the objective of achieving sustainable development, the application of smart information and communication technologies and green informatics are among the priorities of information society policies. The framework of these priorities is to reduce the negative impacts of the information and communication technologies sector on its own and to benefit from smart solutions to reduce the negative effects of other sectors on the environment by using information and communication technologies.

The concept of green informatics is defined as covering all information and communication technologies solutions which are used in reducing the environmental damages of the activities carried out in economic and social life in general and information and communication technologies products and services that perform better than the previous ones in terms of environmental effects (OECD, 2010b:7).

In other words, green informatics, on the one hand, means information and communication technologies that require less energy during production and consumption and thus cause less carbon dioxide emissions; on the other hand, it encompasses information and communication technologies applications that increase energy efficiency in other fields by enabling technological, institutional and behavioral transformations and thus provide various socio-economic benefits(UNESCAO, 2009:ii).

In general, the advantages of green computing can be evaluated in two dimensions: economic and environmental. The increase in energy efficiency thanks to green informatics brings direct economic benefits as it enables cost savings. The more efficient use of energy makes it possible to reduce emissions of carbon dioxide and other wastes, thereby reducing the negative impact on the environment. In short, environmental awareness of green IT is a natural result of improvements in energy efficiency.

Significant increases in energy efficiency can be achieved in industry, transportation, buildings and electricity distribution thanks to smart information and communication technologies. Therefore, it is seen that the benefits of green informatics regarding energy efficiency are mainly directed to other sectors.

The concept of green informatics for the Universities: contextual framework for the smart organizations and green innovation

Through the intensive use of solutions and applications of smart technologies which are frequently using in industry, transportation, buildings and energy sectors, universities and other educational institutions require to efficiently use smart ICTs, smart production systems, smart transportation systems, and smart building systems which will be explained in details as the following titles. In this section, details of these systems, investments in technology and the improvements in green innovation and other improvements achieved through the development of technology will be discussed.

The after issue which needs to be discussed is about knowledge management, it could be taken into account for the model as: indicated at figure 1.

3. Towards a conceptual model for smart universities
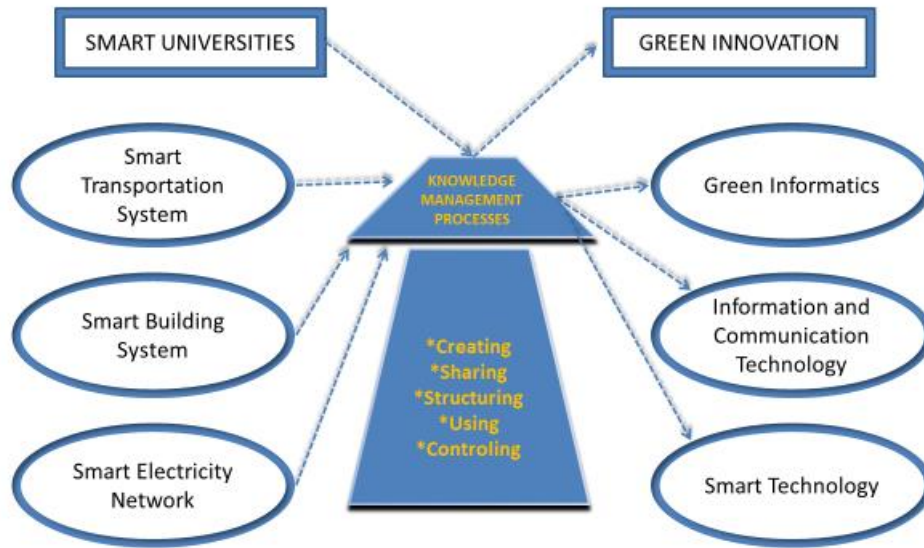
Figure 1: Conceptual model for ''green innovation strategy'' and ''knowledge management'' as mediating role

In this model, the processes of knowledge management have been applied to the elements of smart universities, that is, smart transportation system, smart building system and smart energy systems and it has tried to be integrated with green innovation elements, green information, information and communication technologies and smart technology. Regardless of which sector, an organization starts its business with the knowledge production process. In organizations, knowledge is produced implicitly and tacit based on two types (Sağsan, 2006). Knowledge Management is defined as encoded (explicit) and uncoded (tacit) in some definitions in the literature. Tacit knowledge is the type of knowledge in which employees' work experience is triggered by creativity by meeting talent and skill (Sağsan, 2006). Explicit knowledge can be evaluated as business requirements based on rules, legislation and business analysis within the organization (Sağsan, 2006). If Smart Universities can explicit the implicit knowledge of the employee to serve the green innovation system, the university's awareness of green innovation may begin.

As we consider within the model, what type of knowledge (tacit or explicit) should be known by using smart universities as well as green innovation. For example could it be possible to say that smart transportation system includes explicit knowledge than tacit form of knowledge or vice versa. This example could be reflected by the green innovation part of the model as well. Smart technology could be included more tacit knowledge than explicit form by considering the employees who have full capacity of using their experiences in the field.

Particularly in integrating green innovation into the university, this stage, which implies revealing the tacit knowledge of the employees through social and technical communication sharing mechanisms, can be achieved by building technological and social environments within the organization. The knowledge produced in the university and shared in the official and informal environment is lost unless recorded. Therefore, it is necessary to structure the green innovation assets of smart universities, namely green informatics, information and communication technologies and intelligent technologies. In a sense, it points to the determination of the boundaries of smart universities for green innovation and making them useful for the university. By using the smart transportation, building and energy systems of a university, green innovation can be ready to gain superiority. Thus, the benefit of knowledge management gains importance at this point since it will create a different competition. In the phase of using added value, creating easier smart universities may turn into a benefit within the scope of green innovation studies. The final stage of this model is aimed at supervising the studies carried out by universities for green innovation application. The university, which is in the auditing phase, has to know how much knowledge it produced, how much it shares and structures it, how much it has the ability

to use it and how much it benefits in knowledge management. This is the stage where the studies of the university are supervised. In this way, the organization is to produce new knowledge and thus to revitalize the studies on green innovation.

3.1 Smart Transportation Systems (STS)

With the effect of factors such as the increase in the total size of the world population and the global economy, the shifting of people and goods between different regions of the world with the globalization, the shift of the population from rural areas to cities, and the introduction of modern life style of the less developed regions of the world to both modern and commercial life. The demand for transportation systems for purposes is increasing. In parallel, air, water and noise pollution, traffic accidents and energy consumption are also increasing. It is estimated that around half of the total annual oil consumption worldwide and one third of the total energy consumption worldwide are realized by the transportation sector (OECD, 2012c). Thanks to smart transportation applications, which are the main components, passenger and driver safety is generally increased, transportation network performance increases, network congestion decreases, displacement can be performed more easily and comfortably, negative environmental effects and energy consumption decrease, productivity increases and indirect economic growth and employment growth are supported (Ezell, 2010:2-3).

The benefits of these are further enhanced thanks to the externalities and network impact that result from the use of a variety of smart transport solutions, such as vehicles, drivers, transport networks, etc., which are used together and integrated with each other.

These; electronic payment systems, simulation software, passenger information systems, driver information systems, traffic management systems, planning optimization software, radio frequency recognition, global positioning system, vehicle partnering, vehicle security and driver support systems.

3.2 Smart Building Systems (SBS)

Human beings are in need of buildings due to their needs such as shelter, working area and other purposes. Demand for buildings is expanding both quantitatively and qualitatively due to the constantly increasing world population and various socio-economic dynamics. Generally speaking, the energy consumed during both construction and use of buildings is significant. By 2020, it is estimated that around 23 percent of global carbon dioxide emissions will come from buildings (GeSI, 2008:41).

In addition, it is estimated that around 40 percent of total energy consumption across Europe is related to the production and use of buildings. Although a large portion of the energy consumption associated with buildings occurs during the use of buildings, significant energy consumption also occurs during construction, restoration and demolition phases. When the causes of energy consumption during the use of buildings are examined, it is seen that more than half of the total consumption is caused by ambient heating, followed by water heating, lighting, use of electrical appliances and cooking. On the other hand, the share of energy consumed by the use of lighting and electrical appliances in total consumption is increasing (Kuhn et al., 2011:47-49).

The various improvements to be made in all of these areas make it possible to achieve significant energy savings and to reduce environmental damage. By integrating information and communication technologies to the general level of the buildings, the buildings in which various systems such as air conditioning, lighting, automation, security, telecommunication and management work in harmony and support each other are defined as smart buildings (Greenbang, 2012). Thanks to the smart building solutions that can be applied to both existing and new buildings, processes related to building and using the building can be carried out more effectively, safely, environmentally sensitive, flexible and economical.

Basic components of smart building systems: Building energy management systems, integration of renewable energy sources, computer aided building design, energy flow simulation, participatory engineering software, energy consumption analysis tools, smart lighting systems, smart meters, demand forecasting software. The data obtained from the energy consumption of buildings can be analyzed by means of various software's and forecasts of future energy demand can be made. Thus, reliable forecasts are made regarding the possible change in the energy demand to be realized in a certain region during the year and energy supply plans can be made in compliance with these. This situation helps to prevent shortages and idle capacities in terms of energy supply. Improvements in energy demand management have a positive impact on the overall level of energy efficiency.

3.3 Smart Electricity Networks (SEN)

One of the most basic and widely used energy types today is electrical energy. As the amount of energy demanded in production, buildings, transportation and other areas increases, so does the need for electrical energy and thus the need for electricity transmission and distribution networks. The energy consumed in the process from the generation of electricity to the delivery to end users is significant. It is known that approximately 12 percent of the generated electricity energy goes to domestic consumption and network losses (Ye and et al., 2010). On the other hand, by 2020, it is estimated that around 27 percent of global carbon dioxide emissions will come from the energy sector (GeSI, 2008:45).

From this perspective, the various improvements to be provided in the electricity networks are of great importance both in terms of increasing the total energy efficiency and reducing the damages to the environment. The use of information and communication technologies at all stages of the generation of electricity from power plants to meeting end-user demands is defined as smart grids in which it is possible to manage the needs and capacities of different stakeholders such as producers, intermediaries and consumers in harmony with each other (IEA, 2011:6).

Basic components of smart grids; smart meters, data-based control and surveillance (SCADA), wide area monitoring and control systems, geographic information system, forecasting and planning software, modeling and simulation software, virtual power plants, micro grids, renewable energy resources integration, electric vehicles.

Both the use of renewable energy sources and the widespread use of electric vehicles help to operate the electricity networks more efficiently and economically, contribute to ensuring the reliability and sustainability of the system, and indirectly support the energy efficiency improvements in the system. With the help of these smart systems consisting of innovative solutions and applications based on information and communication technologies, many activities such as design, planning, installation, operation and use in the fields of industry, transportation, buildings and energy can be realized in a more effective, higher quality and environmentally friendly manner. In this way, significant increases in energy efficiency can be achieved in these areas, which have a significant share in total energy consumption worldwide. Efforts to expand and increase the benefits of these smart systems and applications continue to be concentrated on both international and national platforms.

4. Implications for universities

Universities are also a key player for using energy efficiency as a model in the world. For this reason, OECD states in this issue that the most important application areas for energy efficiency improvements by using information and communication technologies are industry, transportation, buildings and energy (OECD, 2010b). The study focuses for the energy efficiency on the only transportation and buildings issues in universities.

4.1 Transportation issue at campus

Transportation issue should be considered by smart technologies in campus. Using innovative applications within the universities make easy for both students and academic staff professional life not only limited within the campus but also could be extended by the city where the university locate. For example, transportation system could be developed by using smart technologies especially to;

- preventing car traffic jam with a campus,

- establishing driver and passenger info system, using decision support system by considering environmental factors such as climate, pollution, solar system, and etc.,

- establishing data-based expert systems that will be used in determining the needs, habits and trends of different modes of transportation and environmental factors and developing related policies such as developing strategic plan on this issue, forming the programs based on the demands, etc.,

- collaborating public sector with private sector for stimulating smart technology usage,

- supporting efforts to make vehicles more compatible with smart systems in order to ensure the widespread use of smart transportation systems,

- integrating fiber optic infrastructure with superhighway,

- establishing traffic signaling systems to regulate traffic flow and traffic safety and reducing energy consumption by benefiting from the maximum capacity utilization,

- exhibiting information boards at the public transportation and bus stops (UBAK, 2011).

4.2 Buildings in campus

One of the most important factors in using smart technologies at campus in universities requires establishing smart building system. First and the most important requisites within this title is solar system. Energy storage, transmission and distribution systems could be effectively used at campus which cause to reducing electricity expenditure. In order to construct smart buildings in any campus for those reasons, some of the critical points should be considered:

- New technology development on energy industry must have priority in particular energy saving, transmission and distribution area in order to increase efficiency,

- Strategic plans should be designed in producing electricity from the policy making aspect and action plans which must include smart grid applications must form for reducing energy losses and harmful environmental emissions.

- Dissemination of smart grid applications should be renovated at the technical infrastructure level and prevented illegal usage.

- The power of local energy sources usage should be developed by using renewable energy saving system, green energy technologies, electro-mechanic equipments, etc (Tübitak, 2004:17-70).

4.3 OECD perspectives for energy efficiency

As a platform in which 34 countries from various regions of the world cooperate to develop common solutions for economic, social and environmental problems. The OECD is a key player in the efficient management of information and communication technologies, increasing energy efficiency, resolving environmental problems and restoring economic recovery. Reveals that it can play a role (OECD, 2010a:5).

The OECD recommends to the member states to take into account and play a guiding role as a general framework in setting strategies and policies to reduce the negative impact of economic and social activities on the environment and to utilize information and communication technologies to improve energy efficiency. These can be summarized as follows:

- Policies related to information and communication technologies, environment and energy should be determined and implemented in harmony with each other.

- Different life cycle phases of R & D, design, production, use and recycling of green IT products and applications for other sectors should be handled with a holistic perspective.

- R & D and innovation activities in the field of green informatics, especially large-scale pioneering projects, include tax incentives, carbon balancing, and so on. mechanisms.

- Green IT should be encouraged to acquire and develop knowledge, skills and competencies specific to different fields such as information and communication technologies, energy and environment.

- It should be ensured that the best practices implemented in the field of green informatics are shared on national and international platforms.

- Efforts to measure the impact of green IT products and applications on energy efficiency and the environment should be supported (OECD, 2010a:5).

5. Conclusion

Demand for energy, which is an indispensable need both individually and socially, is rapidly increasing. On the other hand, there are serious concerns about the continuity of the supply of fossil fuels, which is the primary source of energy consumed today. However, the desired stage has not yet been reached in the studies on the alternative substitution of fossil fuels by alternative energy sources. Therefore, it is vitally important to evaluate the energy consumed in the most effective way possible, in other words to maximize energy efficiency.

The use of information and communication technologies is an agenda item in the world within the scope of efforts to increase energy efficiency. Recently, significant progress has been made in the field of information and communication technologies which have been widely used throughout economic and social life. They have led to significant transformations, as well.

As a result of these developments, it has become possible to benefit from information and communication technologies in solving other problems and providing various improvements in these areas. One of the areas in which information and communication technologies are aimed to be used as an effective tool is to increase energy efficiency. In this direction, the concept of green informatics, which includes both information and communication technologies products and services that cause to less energy consumption, and information and communication technologies applications that increase energy efficiency in other fields, has emerged.

Effects of green informatics on energy efficiency and environment; it could be classified as direct impacts on the information and communication technologies sector, auxiliary impacts on other sectors and systemic effects on long-term behavior changes of people. The greatest potential for increasing energy efficiency through information and communication technologies belongs to green IT applications for other sectors.

In this context, smart production systems, smart transportation systems, smart building systems and smart electricity networks emerge with the intensive use of information and communication technologies in industries such as industry, transportation, buildings and energy where energy consumption is highest.

Thanks to smart applications, information density in these sectors increases; the activities can be carried out faster, more accurately and effectively; thus, significant increases in energy efficiency are achieved and environmental damage is reduced.

Achieving the maximum benefit from green IT applications for other sectors has become a priority in both national and international platforms. In this direction, the main issues related to the strategies, policies and practices implemented worldwide can be summarized as follows:

- Policies related to green informatics can constitute an important part of strategy documents prepared in the field of information and communication technologies as well as can be put forward within the scope of individual policy documents.

- Establish close co-operation and coordination among public authorities responsible for information and communication technologies, energy, environment, economy, science and technology, industry, transport and housing; it is important that the strategies and policies to be established in these areas are compatible with each other and taking into account the issue of green informatics.

- The use of public financial resources is critical in the dissemination of smart transportation systems and smart electricity networks, which require significant infrastructure investment. The role of the public in the smart applications to be realized in the fields of industrial and buildings where private ownership is the subject is mostly directed and encouraged.

- Expectations about the benefits of green IT are not limited to energy efficiency increases; Export capacity, economic growth, innovation, competitiveness and employment are also taken into consideration.

With the intensive use of information and communication technologies in areas such as industry, transportation, buildings and energy, there is a significant increase in the amount of information collected about the elements and activities in these sectors. Therefore, the security of this information and the protection of its privacy emerge as a matter to be considered. Regular monitoring of benefits and costs arising from the implementation of green IT applications for other sectors is important.

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University-Industry Collaboration Projects: A Case of Norway

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Abstract: Innovation often concerns the implementation of research results for operational use. In university-industry collaboration projects, differences in innovation approaches sometimes hinder a project's success. Industrial companies innovate by doing, using and interacting with their stakeholders, applying the so-called DUI mode of innovation. This method of innovation is based on tacit industrial knowledge gained from working experience with products, processes, customers and suppliers. Universities have a long-standing research perspective and use science, technology and innovation—the STI approach, which is based on explicit or codified knowledge. An STI approach focuses on technological solutions rather than users' requirements, so research results often fail to be implemented. Nevertheless, industrial companies need the scientific knowledge of researchers to strengthen their organizational knowledge base and remain competitive in the global market. This article addresses qualitative research on companies that collaborate with universities in research-based innovation projects. Such projects are usually partly funded by the Research Council of Norway and last for three years. Even though many of the projects report innovative outcomes, most of the new knowledge derived from these projects, such as patents and licences, are never used. Different approaches to innovation are some of the obstacles for the creation and implementation of new knowledge in university-industry projects. Our study proposes a set of knowledge management guidelines that can help companies and universities benefit from combining the two modes of innovation (DUI and STI). The guidelines support conversion between tacit and explicit knowledge and are anchored in the SECI- organizational knowledge creation model of Nonaka. Our practical application of the Nonaka's model can reinforce absorptive capacity within universities and companies, so they recognize and utilize the benefits of the other innovation mode. Application of these guidelines can significantly increase the innovation impact of university-industry projects.

Keywords: STI mode of innovation, DUI mode of innovation, university-industry collaboration, innovation projects, knowledge management

1. Introduction

The study concerns the urgent need to increase the efficiency of research-based innovation projects between companies and universities. Though around 50% of the companies report positive outcomes from the projects such as patents and licenses, the majority of them are never used (*Evaluation of research-based innovation projects*, 2018)(H. Chesbrough and Crowther, 2006)(Powell, Owen-Smith and Colyvas, 2007)(Litan, Mitchell and Reedy, 2007).

The comprehensive studies previously done on the regional innovation systems in Scandinavia emphasize that the combination of two different but complementary modes of innovation is the most efficient strategy to amplify the innovation impact of the collaborative knowledge creation between industry and university (Jensen *et al.*, 2007) (Lundvall, 2006)(Lundvall, 2007)(Asheim *et al.*, 2011a). One is the science, technology and innovation (STI) mode, which aligns with the scientific high-tech research strategy and produces radical innovation. The other the doing, using and interacting (DUI) mode of innovation, which is typical for companies to produce rapid incremental innovation based on tacit industry knowledge of the market and customer demand. Too often academic studies on university-industry collaboration (UIC) take the traditional approach of viewing universities as the provider of scientific codified knowledge to industry and underestimate the power of interactive joint knowledge creation between the university and industry (Lundvall, 2007)(Perkmann *et al.*, 2013). This article addresses the research gap regarding how to combine the DUI and the STI modes of innovation by proposing practical guidelines that can be used by the university and industry management to increase the innovation impact of joint knowledge creation and thereby support regions in staying competitive in the globalizing knowledge economy. The proposed practical guidelines consist of knowledge management initiatives

that combine the DUI and STI modes of innovation in university-industry (UI) projects and allow the fundamental differences between academic and industrial worlds to be overcome.

Moreover, the study contributes to the organizational knowledge creation theory of Nonaka by applying Nonaka's tacit-explicit knowledge conversion SECI model to the context of university-industry collaboration in research-based innovation projects in Norway. More specifically, the proposed practical guidelines fall into four modes of dynamic knowledge creation processes: socialization (S), externalization (E), combination (C) and internalization (I) that constitute the SECI circle/model (Nonaka, 1994)(Nonaka and Takeuchi, 1995)(Nonaka, Toyama and Konno, 2000). Anchoring the practical guidelines to the theory provides understanding of how and why the suggested management initiatives can support university-industry knowledge creation and the application of the research results from collaborative projects.

The study concentrates on the region on the west coast of Norway that is characterized by limited product related research efforts and incremental process innovation in low-tech branches which mostly include fishery, aquaculture and shipbuilding companies (Narula, 2004)(Asheim *et al.*, 2011b). The majority of companies are small-medium size enterprises (SME) that innovate rapidly while 'doing, using, interacting' (DUI) with their customers and suppliers. This innovation is based on tacit knowledge gained from working with products, processes, suppliers and customers. However, to stay competitive in the global market the local industry needs to integrate the scientific, explicit knowledge of researchers anchored in the STI mode of innovation (Asheim *et al.*, 2011b)(Jensen *et al.*, 2007)(Lundvall, 2007). Therefore, the industry collaborates closely with the local campus of the Norwegian University of Science and Technology. This collaboration is the platform for the 'innovation project for the industrial sector' program (BIA in Norwegian) funded by the Research Council of Norway (RCN). The program promotes regional collaboration between working and research organizations. BIA projects are company-driven three-year long projects that incorporate research activities with a university or research partner/supplier (*The Research Council of Norway*, 2019). The government covers approximately 40% of the BIA project cost. Nevertheless, economic support is not enough for collaborative projects to succeed in innovation. There are different agendas for collaboration: researchers need to publish while those in industry want tangible results; additionally, different time-perspectives and approaches to conducting projects hinder innovation (Hansen, Mork and Welo, 2017).

This study applies qualitative research to analyze how to overcome challenges in combining a university's STI and an industry's DUI modes of innovation. The next section (2) is a brief of the state of the art in the research field. Section 3 explains the research methods applied in this study. Section 4 highlights the challenges of combining DUI and STI modes of innovation in the regional context and why Nonaka's SECI model can be applied to overcome these issues. Section 5 presents and discusses the research findings, which are knowledge management guidelines for UI innovation projects. The conclusion with limitations of the study and future research are presented in Section 6.

2. Literature review

The prior studies on UI interaction concentrate largely on the input drivers and outputs of collaborative projects and correlations between them rather than managing knowledge processes in collaboration. Academic engagement related to commercialization such as patents, licenses and spin offs (Link and Siegel, 2005) (Perkmann *et al.*, 2013) (Jonsson *et al.*, 2015), the impact of geography and research field proximities on UIC (Laursen, Reichstein and Salter, 2011)(Petruzzelli, 2011) and cultural differences between universities and industry affecting the UI partnership (Plewa, Quester and Baaken, 2005) (Plewa, 2010) dominate the studies in the UI research field.

The study that focuses on managing knowledge processes in innovation projects between university and industry is based on the experiences of Satakunta University of Applied Science (Laine, Leino, and Pulkkinen 2015). Satakunta university's knowledge managing models support industry in decision-making regarding the development of a new technology; the focus is on the application of the STI mode of innovation rather than the combination of STI and DUI modes that requires tacit industrial knowledge in the creation and application of new knowledge.

The literature on university-industry collaboration in innovation highlights the urgent need for study on how to manage university-industry collaboration to provide more innovation (Perkmann *et al.*, 2013).

3. Research methods

Studying knowledge processes in collaborative projects requires understanding of individual experiences; therefore, the qualitative interview was chosen as the most appropriate research method (Perkmann *et al.*, 2013) (Yin, 2016). Fifteen semi-structured, in-depth interviews were conducted including with two academic scholars, one industrial PhD, six project managers from industry and six project managers on behalf of the university.

Two colleagues of the first author were involved in UI collaborative projects during the three-year study of the topic. One colleague was the university project manager and the other was an industry PhD that eventually had to take a role of project manager on behalf of the company. Listening to frequent discussions related to the project between her colleagues allowed prolonged engagement in the field of study and gave real insights into the subject (Lincoln and Guba, 1985). Such a setting provided the opportunity for occasional informal interviews. Nine have been documented.

Additionally, the university's environment with frequent interaction with academics involved in different research projects with industry, was used to arrange a group interview with fourteen PhD students and two senior researchers. The group interview provided additional data for the research. Furthermore, a project report from one BIA project provided one more perspective on the managing of knowledge processes in UIC projects. These four approaches to corroborating data refer to the principle of triangulation that seeks at least three different methods of verifying the data to strengthen the credibility of the study (Patton, 2002).

Sorting, reorganizing and interpreting the data resulted in practical knowledge management guidelines for UIC projects (Yin, 2016). These guidelines use the organizational knowledge creation SECI model of Nonaka to combine STI and DUI modes of innovation, which is explained in next chapter.

4. SECI model to overcome contradictions of DUI and STI modes of innovation

This chapter explains why the SECI model of Nonaka is helpful for combining DUI and STI modes of innovation.

Collaboration in innovation projects allows organizations to update their knowledge base by exploring and exploiting new knowledge, which contributes to competitive advantage (Huggins and Johnston, 2009)(Huggins, Johnston and Thompson, 2012). Nonaka presents the organizational knowledge creation process through conversion of knowledge between tacit knowledge (difficult to express in words) and explicit knowledge (codified, documented). Knowledge creation undergoes four conversion processes, including socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to explicit) and internalization (explicit to tacit) (Nonaka, 1994)(Nonaka and Takeuchi, 1995). Transitions between tacit and explicit knowledge create an SECI loop that enriches the organizational knowledge base and generates the need for new knowledge, which triggers a new SECI cycle of knowledge creation. In this way, multiple SECI cycles create a knowledge spiral that reflects a continuing dynamic knowledge creation process. Figure 1 depicts SECI model.
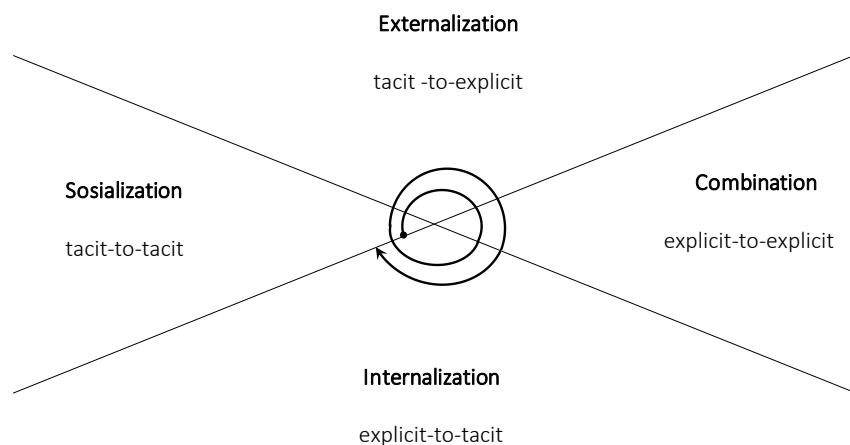
Figure 1: SECI model of organizational knowledge creation (Nonaka, 1994) (Nonaka and Takeuchi, 1995)

In UI innovation projects, these conversion processes face some obstacles that hinder the combination of DUI and STI modes of innovation and thus hamper creation and use of new knowledge. This is explained further in more detail.

- Socialization. As past research on regional and national innovation highlights, tacit industrial knowledge is crucial in the development of new knowledge in collaborative innovation projects (Lundvall, 2007)(Asheim *et al.*, 2011b). SME can rapidly sort a) how to solve practical problems, b) who to work with, and c) when it is the right time to introduce and implement innovations. Nevertheless, dedication of the resources to collaborate with universities is demanding for SME's due to limited resources (Lee, 2003). It requires management initiatives that will support industrial tacit knowledge and the understanding of it by the researchers (Brunswicker and van de Vrande, 2014).

- Externalization. Here expectations from the collaboration take explicit form in the documentation of project objectives. When partners have different agendas entering project, the clarification of expectations is a challenge; for example, industry wants tangible results, while academics must publish (Hansen, Mork and Welo, 2017).

- Combination. Explicit knowledge can take the form of prototype building. The study demonstrates that industry often leaves this process to the researchers. Academics working alone on a problem can fail to meet industrial requirements. Moreover, if knowledge of the industry is not integrated into the prototype, project results will not be implemented in real life (Mork, Hansen and Giske, 2016).

- Internalization. Knowledge or 'learning by doing' converts explicit organizational knowledge into individual tacit knowledge. That usually happens while testing a prototype. As this study indicates, new knowledge continuously derived during the project reveals new industrial and research needs and requires corresponding changes in project objectives and managerial initiatives that will support organizational structures for further knowledge development and applications. Implementation of these changes is often ignored in favor of the initially documented objectives and plans to achieve them and is one of the reasons why research results from a project are not implemented.

Table 1 summarizes the practical guidelines identified for each knowledge conversion process of the SECI model that support the combination of DUI and STI modes of innovation.

Table 1: Application of the SECI model to combine DUI and STI modes of innovation in UI collaborative projects

Conversion process	Practical guidelines to combine DUI and STI
S	Incorporation of the projects in industrial environment Incorporation of students in industrial environment Active engagement of operational users Absorptive capacity of involved people
E	Industry defines the project objectives in research applications Research objectives must address industrial need Research objectives must consider absorptive capacity of involved Clarification and quantification of project results Commitment and quantification of the recourses
C	Integration of realistic data in the project Rapid, frequent prototype building
I	Gradual assimilation of knowledge in both organizations Refining of project and research objectives in the end of each SECI cycle Revising of knowledge management guidelines in the end of each SECI cycle

5. Practical guidelines for combining DUI and STI

The following subsections present and discuss the research findings from Table 1 separately.

5.1 Socialization: Sharing tacit knowledge between industry and university

The socialization mode establishes success for collaboration. Written specifications are not enough to understand operational users' requirements. Researchers have to become an integral part of a company to

comprehend the tacit knowledge of how the DUI innovation mechanisms work in the industrial network. It is also important to understand the industrial organization's history and methods of working with customers and suppliers. This exchange of tacit knowledge between researchers and industry can be a key to common knowledge creation and innovation in collaborative projects. The research specifies how to put this tacit-to-tacit knowledge conversion into practice in the following subsections.

5.1.1 Incorporation of the projects in industrial environment

Key people at SMEs are a scarce resource, and it is not easy to move them from daily operations into innovation projects. A better option is integration of the innovation project into the companies' and customers' operative environment and their daily activities. This opens the possibility for industry to be involved in the project actively and provides the opportunity for productive UI interaction. Additionally, if possible, building prototypes in the real or nearly real environments helps those in industry better understand the implementation benefits and invest in making the research results operational.

5.1.2 Incorporation of students in industrial environment

The research determines that placing students in industrial environments from the project's beginning helps students cognize the industrial value such as complementarity between research requirements and industrial expectations. Daily interaction between students and employees creates trust and mutual understanding that amplifies knowledge exchange, co-creation and application processes (Nonaka and Takeuchi, 1995)(Krogh, Ichijo and Nonaka, 2000). PhD students and MSC students can work with a combination of research tasks and engineering related industrial innovations, for example, product and process development to recognize how the company innovates by DUI with each other, their customers and suppliers.

5.1.3 Active engagement of operational users

Active engagement of operational users, external and/or internal company customers, is critical prior, during and after the project. In the beginning, the researchers and industry should study customers' requirements by going to the actual place and talking to the actual users and trying to experience customers' work routines by performing some of their jobs (Overvik Olsen and Welo, 2011). This can provide insight into customers' tacit knowledge and better present their requirements.

5.1.4 Absorptive capacity of involved people

This study demonstrates that the involvement of people with relevant backgrounds is extremely important. Senior researchers with experience working with industry and project managers in industry understand the requirements and values of academic and industrial worlds. People with these backgrounds are usually capable of effectively communicating knowledge between the university and the company and bridging DUI and STI modes of innovation. They can acquire, create, apply and disseminate knowledge in both organizations and contribute to the development of organizations' absorptive capacities (Cohen and Levinthal, 1990).

5.2 Externalization: From tacit to explicit

Externalization is a process of transforming tacit knowledge into explicit knowledge. In UIC projects this means conceptualization of project objectives, research requirements, expectations from the project and efforts needed to execute the project. At this stage, knowledge takes the shape of documents, contracts and agreements of collaboration in innovation between partners.

5.2.1 Industry defines the projects objectives in research applications

The study indicates that project objectives are imperative for a company's commitment to the project. The objectives must generate the substantial commercial value for the company and the customers/operational users of the technology solution. At this stage, operational users' tacit knowledge is converted as precisely as possible into an explicit form of project requirements. Our research reveals that companies often leave writing funding applications to researchers because they do not have the time or experience to do so. Researchers can describe the need for innovation and propose solutions that address the technology needs from the theoretical perspective, which makes the company less interested in the project and not committed enough to dedicate resources to execute the project and integrate the results. Therefore, a company must invest time and play a leading role in developing the funding application (to RCN) together with the university.

5.2.2 Research objectives must address industrial need

The research objectives must address the technology needs defined by the company in the project objectives. The researchers should demonstrate their understanding of the industrial requirements by illustrating some applications of the technology. It is important that research objectives are made explicit in 'industrial language' quantifying the benefits industry gets from deploying technology solutions.

5.2.3 Research objectives must consider absorptive capacity of involved

The transformation of customer needs and requirements into research objectives must always take into consideration the innovation capability and competence of stakeholders. The knowledge development should be within industrial absorptive capacity, the ability to recognize the value of new knowledge and integrate and apply it in operational environments (Cohen and Levinthal, 1990). The researchers must search for knowledge scope and areas which can be successfully implemented in the industrial companies. The limitations of knowledge can be within technology domains and manufacturing methods, but also regarding knowledge of operational use of new products or processes.

5.2.4 Clarification and quantification of project results

The study indicates that the commitment of partners to the project depends on their clear understanding of what they can expect from the project and partners. The expectations from both sides must be quantified and explicitly described. This includes the specification of the technology maturity level and other performance metrics of the proposed solution.

5.2.5 Commitment and quantification of the recourses

Research demonstrates that a plan for the transition of the research results to real life define who in the company will implement the results. Their competence, time and effort must be qualified for the technology to be deployed.

Often, the only who understand the result of the project are the researchers. When the project ends, and the researchers leave, and there is no one in the company who can make the research results operational. Therefore the company must consider innovation an integrated part of the organizational strategy and prior to the project start should plan to build expertise within the organization (Lazonick, 2005). The positive experience is demonstrated by companies that invest in an industry PhD program that involves company employees earning a PhD linked to the innovation project with a university. It allows candidates to develop knowledge of the company and implement project results.

5.3 Combination: Building knowledge through prototypes

5.3.1 Integration of realistic data in the project

Our research reveals that operational users can be skeptical about the application of new knowledge derived from the laboratory to the real world because the gap between experimental and actual context is too great. Therefore, it is important to integrate real data when building or testing a prototype. For instance, when developing a new production process, some of the laboratory equipment should be close to full-scale production equipment in the company.

5.3.2 Rapid, frequent prototype building

This is a step in an innovation project when new knowledge assumes a concrete or tangible form when the concept of new product or process is tested by prototype.

Prototypes are essential for communication, exchange and knowledge building. Iterative processes of building and elaboration of prototypes combine the scientific knowledge of researchers and the practical knowledge of industry, bridging them through STI and DUI modes of innovation (Mork, Hansen and Giske, 2016). Frequent prototyping allows for incremental learning and extends the existing knowledge of both partners in a manageable way, progressively increasing the absorptive capacity of both the university and industry (Cohen and Levinthal, 1989).

Furthermore, building prototypes together allows partners to learn from each other by DUI. This experimental method of innovation is authentic to industry, and therefore industry professionals are more open to exchanging, creating and applying new knowledge (H. W. Chesbrough and Crowther, 2006).

Building and testing numerous prototypes elicits feedback from operational users and proves that partners are committed to providing value. This strengthens the trustworthy relationship between the university and industry, which is a precondition for an effective knowledge creation processes (Krogh, Ichijo and Nonaka, 2000).

5.4 Internalization

5.4.1 Gradual assimilation of knowledge in both organizations

The tacit knowledge of individuals involved in the project must be disseminated to others in the university and in industry after each prototype build. This study demonstrates good practices of sharing knowledge via PhDs' presentations of project status and workshops demonstrating prototypes from the project. It helps to assimilate knowledge and build competence in both organizations by gradually combining DUI and STI modes of innovation.

5.4.2 Refining project and research objectives in the end of each SECI cycle

Each prototype test allows users to uncover new technological demands. Moreover, the change of external conditions, like political regulations or new technology, impact project requirements. This requires the reevaluation of initial project objectives, which triggers a new SECI loop of knowledge conversion. Each SECI circle supports double-loop learning that enables modification of the project and research objectives and ensures continued value of the project (Argyris, 1991).

5.4.3 Revising of knowledge management guidelines at the end of each SECI cycle

University and industry gain technical knowledge and collaborative experience while going through socialization, externalization, combination, and internalization. They share mental models of technical know-how and ways to collaborate, which becomes an asset for UIC. Each SECI loop must initiate modification of knowledge management guidelines; the partners shall elaborate how they combine DUI and STI modes of innovation and how to benefit more from interactive collaboration processes. Management in both organizations should evaluate the sufficiency of the resources dedicated to the project, their capacities to acquire, assimilate and apply knowledge in academic and industrial environments, places for knowledge creation, and the involvement of operational users.

6. Conclusion

This study suggests a practical knowledge management guide for university-industry innovation projects that breaks down barriers by combining STI and DUI modes of innovation in BIA projects. The guidelines are anchored in the SECI knowledge conversion model of Nonaka to accentuate how they help to convert knowledge between tacit and explicit and enhance knowledge creation during innovation processes.

Continuing use of practical guidelines can help universities and industries to build absorptive capacity within organizations, to recognize the value of the other mode of innovation and to gain competence in combining STI and DUI modes of innovation (Asheim *et al.*, 2011b).

The research has been done on a small sample of interview objects and limited number of UI innovation projects. The research was also restricted to one region on the west coast of Norway. Nevertheless, the obstacles of collaboration between researchers and industry are similar worldwide and the sharing of experiences and practices can help organizations and regions benefit from combining STI and DUI modes of innovation.

The proposed guidelines for managing knowledge in UI innovation projects require verification. A focus group of the representatives from the university, industry and Norwegian Research Council must evaluate the guidelines. The evaluators cannot be the same people involved in generating of guidelines. The ideal evaluation would be comparing university-industry innovation projects with and without the guidelines applied. This is demanding because of the three-year duration of the project, but the benefit of having such a knowledge management tool can significantly increase the innovation impact of university-industry collaborative projects and drive regional and national economic growth.

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Using Smart Technology in Sustainable Entrepreneurship in Island Tourism: A Preliminary Research

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Abstract: Smart technology plays a crucial role in innovation, and innovation in turn is essential for entrepreneurship. This study aims to understand how smart technology can play a part in sustainable entrepreneurship, in the context of tourism on a small island. In particular, this study will look at smart tourism, and the possibilities for sustainable tourism entrepreneurship on the small Mediterranean island of Cyprus. While only a developing region, a *de-facto state*, can technology be developed that will allow North Cyprus to develop as an area of smart tourism? This paper will higlight the technology needed, as well as the new business models this will entail. The research methodology begins with a qualitative survey. in the form of unstructured interviews with a small number of entrepreneurs in the region, with the aim of undestanding the entreprenuers' perceptions of smart technology, and whether they see a role for it in the future of their business, and the region. It is planned to used mixed methods, and to follow up the themes and questions raised by the interviews, with a quantiative survey to be administered to around 300 entreprenuers around the island. A quantitative survey will also bring forth the amount of understanding of smart technology in the region, as well as the role of sustainable entrepreneurship and smart technology. The initial results from the interviews reveal that entrepreneurs are not familiar with the term smart tourism, yet they can see some benefits of the adoption of smart tourism in Cyprus. The evaluation of the interviews indicate that entrepreneurs, while unsure about the availability of smart technology, were keen to learn more about the technology, and possibly to innovate and take advantage of this new technology. Entrepreneurs were also interested in how smart tourism could increase knowledge on sustainable tourism, and therefore sustainable entrepreneurship in the region.

Keywords: smart technology, smart tourism, sustainable tourism, North Cyprus, entrepreneurship, Internet of Things

1. Introduction

The research was carried out in three phases. Firstly, a review of the literature on smart tourism, and on sustainable tourism was carried out. Next, unstructured interviews took place with five tourism entrepreneurs in the region, as well as a representative of a local council. Finally, the interviews were analysed in terms of the important ideas that came through.

The main findings of the interviews are that the Cypriot entrepreneurs are not familiar with the term smart tourism at all. When the term was explained to them, they could see practical benefits to creating a smart tourism platform in North Cyprus. However, they were reticent in how much effort they could give to such a new venture, and there were differing opinions as to how smart tourism could be funded and operated. The evaluation of the interviews indicates that entrepreneurs, while unsure about the availability of smart technology, were keen to learn more about the technology, and possibly to innovate and take advantage of this new technology. Entrepreneurs were also interested in how smart tourism could increase knowledge on sustainable tourism, and therefore sustainable entrepreneurship in the region.

2. What is smart tourism?

The past decade of advances in technology, and particularly communications, has given rise to a new paradigm in tourism, that of *smart tourism* (Buhalis and Amaranggana, 2014; Xiang et al., 2015). Improvements in data communications and the technology leading to cloud computing has made access to the internet and huge depositories of information commonplace (Buhalis & Leung, 2018). Add onto this peripheral tools such as beacons, and drones, as well as specialised Artificial Intelligent software, and the ubiquitous Smartphone, and the Internet of Things, and we begin to build up a picture where everything is interconnected and interoperable (Buhalis & Leung, 2018).

Smart tourism needs two factors to work, firstly a smart tourist, armed with a Smartphone and a fast connection to the internet. It also needs a smart tourism destination, a touristic region where knowledge on the region is

available through cloud computing, the Internet of Things, and end-user internet service systems (Buhalis and Amaranggana,2014).

The smart tourism destination, where knowledge sharing between the smart tourist and the smart destination, is an extension of the smart city concept (Del Chiappa & Baggio, 2015). Del Chiappa and Baggio (2015) consider the concept of smart tourist destination to still be evolving, and that it is not possible to define it as yet. In a basic context it is a network system of stakeholders delivering touristic services to smart tourists, supported by a communications infrastructure, giving a digital environment which sustains knowledge sharing, cooperation, and even open innovation (Del Chiappa & Baggio, 2015). Throughout the world destinations are evolving as "smart". Everything becomes connected, and the physical world combines with the digital world creating a new hybrid system. In this new smart tourist destination, tourists as well as touristic business owners, and other stakeholders, interact, communicate, collaborate and share information in new and novel ways.

Increasing the information of the touristic region to the tourist adds value to the tourist's experience in the region, so the major objective of any smart tourism is to enhance the tourist experiences. At the same time, such a system can help towards improving destination management.

 Some tourist destinations have been early adopters of the technology. Benidorm, in Spain, was one of the first smart tourist destinations (Femenia-Serra & Ivars-Baidal, 2018). Benidorm has been a successful tourisit destination since the 1960s, with annual visitors of over 16 million in 2018 (Femenia-Serra & Ivars-Baidal, 2018). The system installed in Benidorm is a private/public setup, and initial funding was from the Valencian Regional Government, and later 4 million Euros from the Spanish Government.Smart tourism is also being developed in Asia, with the Governments of China and South Korea heavily investing in developing the technological infrastructure to support smart tourism (Gretzel at al., 2015).

However, it is not only large and successful destinations that are developing smart destinations. Tahiti, in the Pacific, has been losing tourists since the late 1990s, with tourist numbers down to 180,000 (Oates, 2015). In 2015, the French Polynesian Ministry of Tourism announce the Tahiti Smart Tourism initiative, partnering an innovation lab in Tahiti with a US based company specialising in startups (Oates, 2015). Some of the first priorities of this project were to expand free Wi-Fi beyond the seaside resorts, and to digitalise the visitor experience (Oates, 2015). The leaders of the project realise that if visitors can connect anywhere, without costs, it will create a fuller travel experience for the visitor (Oates. 2015). The type of applications being planned are geo-location apps for self guided tours, finding friends apps, instant messaging within the islands, and a 24 hour assitance service to be available in a number of languages (Oates, 2015).

The purpose of the smart destination is to add value to the experience of the tourist, and already in the body of literature there are a number of articles on the perceived value of the destination. In a study in South Korea, Lee et al., (2018) found that the actual real experiences encountered at the destination are more important in creating perceived value compared to the tourists' experiences with the Smart Tourism Technology (STT). Reseach was also done in the city of Porto, in Portugal, to assess the availability of internet access in the city and how it affected the tourists' satisfaction in the city (Liberato, Alen & Liberato, 2018). Liberato, Alen and Liberato (2018) found that the availability and quality of internet access at the airport and hotels and resorts in a tourist region were of the utmost importance in creating the initial perception of the touristic experience in the area. Even without specially created Smart Technology Apps, it is known that the quality and availability is an important part of a touristic experience, as these days tourists create their own experience through existing Smartphone apps and social media (Buonincontri & Micera, 2016).

3. The setting

Cyprus could be considered the ideal holiday destination, an island in the Mediterranean Sea, with its unspoilt natural beauty, miles of blue flag beaches, sunshine, ancient monuments and sites, and the natural beauty of the two mountain ranges, as well as the culture, cuisine and home grown wine, not forgetting the slow pace of life. It is often described in holiday brochures as "heaven on earth". The North Cyprus Tourist Board use the tagline "A corner of earth touched by heaven".

However, since 1974 Cyprus has been divided. The Republic of Cyprus has been a member of the European Union since 2004, with over half a million tourists entering in June 2019 (Statistical Service RoC, 2019). North

Cyprus is an unrecognised *de-facto state*, created after the civil war in Cyprus, and has remained in limbo ever since, with crippling economic and political embargoes. It falls behind the Republic of Cyprus in all economic concepts, and is a developing country. For the same period, June 2019, the incoming number of tourists in the TRNC was recorded as 150,051 (KKTC Turizm Planlama Dairesi, 2019).

3.1 The importance of tourism in North Cyprus

Tourism in Cyprus dates back to the 1930s, peaking in the 1960s (Yasarata et al., 2010). Following this, tourism in Cyprus can be observed as two distinct phases, up until 1974, and post-1974 (Avgousti, 2008). Leading up to 1974 Cyprus was fast becoming a destination of sun and sea, with Famagusta especially being seen as the natural successor to Cannes, St. Tropez, or Nice in the season. In the summer of 1974, the glamorous district of Varosha, with its new high rise hotels and beach clubs, was captured by the Turkish Army as part of its Peace Operation. The second phase is post-1974, with the island divided by a "green line" and United Nations troops patrolling the border between the two communities. Turkish Cypriots were quick to build on the success of Kyrenia as a holiday destination and development was concentrated in that area. The Greek Cypriots after the partition of Cyprus were no longer able to access Kyrenia and Famagusta, and they started to develop their seaside towns of Larnaca, Limassol and Paphos, with significant growth after 1975 (Avgousti, 2008). Clerides and Adamou (2009) relate how Cyprus struggled with tourism growth in the 1980s and 1990s. Unfortunately, tourism in the Republic of Cyprus has brought the typical negative effects of damage to the flora and fauna of the community, as well as aesthetically displeasing architecture and dangerously insufficient water reserves (Yasarata et al., 2010). Tourism in North Cyprus increased from 1998, when many hotels were built to cater for "casino" tourism, after the banning of casinos in Turkey that year (Yucel Besil et al., 2010).

While the Republic of Cyprus hosts 2.4 million visitors every year (KPMG, 2015), the non-recognised Turkish Republic of North Cyprus gets 1.1 million visitors per annum (TRNC State Planning Organisation, 2015). Green tourism in the Republic of Cyprus has around 600 bed capacity, while in the North it is less than 100 bed capacity. In addition to this, through the Cyprus Sustainable Tourism Initiative, all hotels and tourist facilities in the Republic of Cyprus are being encouraged to take a more responsible attitude towards nature.

Both the Turkish Cypriot Chamber of Commerce and Cyprus Chamber of Commerce promote the idea of a united Cyprus, as both organisations strongly believe that a settlement in Cyprus will being economic benefits to all. The Chambers have created joint bi-communal projects for enhancing economic cooperation, emphasising the benefits of a Cyprus settlement (KTTO, 2016). Tourism has been specifically mentioned as a sector for investment and exploitation. A sustainable approach to tourism is even more important in the tourism development of islands, such as Cyprus, as islands usually have a fragile eco-environment, limited water resources, and possibly inadequate waste management systems, and high competition for land use (Baldacchino & Ferreira, 2013). However, Farmaki et al. (2016) note that there is a lack of awareness about sustainability on the island of Cyprus, and that raising awareness of the topic is important in order to implement sustainable tourism.

3.2 Technology and Innovation in North Cyprus

Telecommunications technology was adopted early by Cyprus, and the island continues to strive towards implementing the latest technology (Howells & Soujeri, 2006). Mobile phones have been a huge success in North Cyprus, with uptake figures very high for Europe (Howells & Soujeri, 2006).

GSM arrived in 1996 as Telsim. Considering some villages didn't receive terrestrial telephone lines until 1995, the service was warmly welcomed. Over the years the services provided by the GSM service providers in Northern Cyprus has improved, moving from simple calls and SMS messages, to MMS, GPRS and Internet connection. By 1999 70,000 mobile telephones were being used in Northern Cyprus (Howells & Soujeri, 2006). There are two mobile phone telecommunications companies in North Cyprus. KKTC Telsim, a subsidiary of the Turkish telecommunications company Telsim. Telsim in Turkey was originally the state run GSM service provider. In 2005, KKTC Telsim was bought by Vodafone, as part of the deal to buy Telsim in Turkey (Howells & Soujeri, 2006). A second service was introduced on 28 July 1999 by Kuzey Kibris Turkcell, as a subsidiary of the Turkish telecommunications company Turkcell. Both companies have invested around US$30m (Howells & Soujeri, 2006)..

The constant electricity power black outs and power surges make using communications technology and computers in the TRNC a difficult task at times. Demand has risen for wi-fi, as sometimes new home users need to wait up to 2 years before receiving their terrestrial communication link.

Recently, a protocol was signed between Turk Telekom and the TRNC Department of Telecommunications to further develop the capacity and quality of the internet in North Cyprus (Turk Telekom Medya Merkezi, 2018). The internet is provided by one fibre optical cable under the sea, which joins Cyprus to the Turkish Internet Highway.

KKTC Telsim introduced 4G in 2013, while KKTCELL introduced LTE 4G in 2014, and it is available in most of the region (Yeniduzen, 2014). While the speed of the internet in North Cyprus may not be as fast as some European countries, the infrastructure is good, they are few places where a signal does not reach. From this point of view, the region is ready for an implementation as a Smart Tourism Destination. Most of the restaurants and bars have free wifi, without the complex and lengthy "sign in" procedures of Western Europe, usually automatic or with a simple password.

3.3 Entrepreneurship in North Cyprus

The body of literature on entrepreneurship in North Cyprus is limited. A TRNC industrial survey in 1999 put the number of small to medium sized enterprises in the region at 7790, and 18% of these were tourist based enterprises (TRNC Prime Ministry, 1999). There are very few large enterprises in the TRNC. In 2014, official statistics estimated that the tourism contribution to the GDP achieved 8.7% of the TRNC total GDP.

Research into entrepreneurship in North Cyprus in 2012 showed that approximately 7.8% of enterprises were in the hotel and restaurant sector (Howells, 2015).

The major challenges to the North Cyprus entrepreneur are the continuing international economic embargoes, and a lack of investment in the infrastructure of the region (Howells & Krivokapic-Skoko, 2010). Typical of many island economies, the region has a very limited domestic market, but the problems are insurmountable as with an international embargo it is impossible to export anything (Howells & Krivokapic-Skoko, 2010). The infrastructure in terms of transport, communication, and services has been severely neglected, with little more than maintenance carried out since 1974 (Howells & Krivokapic-Skoko, 2010).

Despite the many hurdles to creating and continuing a healthy enterprise, the Turkish Cypriot entrepreneur is "pulled" into entrepreneurship (rather than being "pushed" into it) (Howells & Krivokapic-Skoko, 2010).

4. The interviews

The respondents for the qualitative study were found by a survey of touristic pages on Facebook in a touristic, yet rural area of North Cyprus. The respondents all had a Facebook page for their business, and they were posting regularly. Some respondents were also using Instagram. One respondent was consistently posting on the "story" section of Facebook and Instagram every day, sometimes videos and sometimes photos.

The interviews were unstructured, in that apart from being asked did they know what smart tourism was, the respondents commented on what they thought smart tourism could do, how their business could be involved, and how tourists might use such a system.

One entrepreneur owns an organic hotel situated inside a large organic farm, and has recently opened an organic grocery shop in Nicosia. The farm and hotel are self sufficient with a well for water and solar panels for electricity. She is committed to sustainable environment, and hopes the farm can be an example to other entrepreneurs, to see how it is possible to create a business that does not destroy the local environment. She believes it is important to be responsible in food production, the use of energy and water, and other resources, so that a balance is maintained. As well as inviting visitors to this special area, the owner encourages schools to bring school trips so that pupils can see close up what is possible.

> *"I'm currently using local TV stations, as well as social media to bring in customers. I'm not really prepared to put a large financial investment into smart tourism, as I am already paying a lot for advertising. The social media is not really bringing customers my way. My customers are already in Cyprus, so I don't see how smart tourism will work for me." Female, 60*

One insightful entrepreneur sees the link between smart tourism, organic farming and sustainable tourism,

> *"I would like the support of the authorities. I want to have a sort of agro-tourism centre here and open it to tourists who come for the day, enjoy the surroundings and a Cypriot meal and drink. We would like a loan to do this." Female, 65*

One enterprising woman found a niche by introducing "pick your own" strawberries, after visiting this type of farm in Kent in the UK. She has added a small cafe to her strawberry farm, in order to attract visitors. The strawberry farm has its own Facebook site, but it is not used. The owner's son often posts photos of the farm to Facebook and Instagram, but the settings are to "friends" only.

> *"I would want this app to be independent. I don't want it linked up to the government or local council. I'm not sure I have time to text or chat to tourists. When the strawberry season is full on I am incredibly busy" Female, 50*

Other entrepreneurs in the area are not so heavily invested, they simply use a stand at the bottom of their garden to sell produce.

> *I quite enjoy being at the stand at the weekend. It gives me a chance to meet people, and to make some money from what I would have made in the kitchen anyway. I don't need the internet to send me customers, they are coming anyway. Female, 52*

One entrepreneur is an avid fan and user of social media. Each day he posts something to his enterprise's Facebook and Instagram "story", usually something funny.

> *I like being able to give back to the village. When I first started the restaurant I was keen to make a lot of money, but now I think a good lifestyle is more important. I want to keep the seaside natural, so that my daughter will be able to benefit in the future. Do I really need smart tourism to bring new customers? Everybody knows who we are. It's a bad season, the economy is bad. Will foreign tourists drive out this far? Male, 42*

The final entrepreneur did not believe a separate application for a smart phone was necessary:

> *"Look, here it is, on Google Maps. Everybody is there. They can look it up. Why build a separate app? Everything is already on their phones, Facebook, Google. It would need a serious investment to build up something like you suggested. Will anyone use it when their phones are already full?" Male, 38*

5. Analysis of the perception of Smart Tourism

Smart Tourism is a new concept, an eco system based on the four elements of digital technologies, consumers, business (both from the Tourism sector and elsewhere), and the tourist destination itself, most recently defined by Perfetto and Vargas-Sanchez (2018). Gajdošík (2018) enhances this model, suggesting smart tourism is not the "ultimate goal", but that a better tourism experience should be our goal, with this ecosystem leading to competitive sustainability.

It is difficult to compare this initial research to results in the body of literature, as most of the literature on smart tourism is concerned with the tourist and the tourist experience and not with the tourism sector business owner. From the required four elements (Perfetto & Vargas-Sanchez, 2018) North Cyprus has some of the elements in place. A commitment to smart tourism from business owners could be forthcoming, as Turkish Cypriot business owners, especially in rural areas, are extremely supportive of sustainability.

While the number of interviewees is small, set at 6, the information given was very interesting. Most importantly, none of the interviewees had heard of smart tourism, smart cities, or smart tourist destinations. All of the interviewees use social media, mainly Facebook. Only four of them have a Facebook page for their business. Only two of them regularly post to their company Facebook and Instagram accounts. They do not pay for advertising on these platforms.

Once the concept of smart tourism was explained, every entrepreneur saw the potential for tourism satisfaction and the possible benefits of knowledge sharing. Most believed that any platform developed would need to be a partnership of public and private funding. While acknowledging the benefits of smart tourism, these entrepreneurs believe that their own input into such a technological system could be limited due to their own heavy workloads.

Further research is essential, to examine the remaining three elements of digital technology, consumers, and the tourism destination itself. While North Cyprus has strong branding as a unspoilt island destination, there are many factors that are detrimental to that strong branding, such as casino tourism, large luxury hotel tourism, and casino tourism. Further research has already begun with a research project to ascertain the perceptions of consumers to smart tourism.

6. Conclusion

Although knowledge about smart tourism is minimal, the entrepreneurs of the Turkish Republic of North Cyprus are tech savvy. They promote their business through their smart phones, mostly with specially created pages on Facebook or accounts on Instagram. They post frequently, and maintain a relationship with their customers. A growing number of tourism related entrepreneurs are seeing the benefits that can be gained from the use of social media

A Smartphone application for tourists, giving them maps, information, and the ability to contact local touristic enterprises is technically achievable. However, the investment it would need does not seem to be in line with the possible usage of the system. Social media is free, while sponsored advertising on social media is very cheap. The entrepreneurs talked to were not happy about investing financially in such a product. North Cyprus has experienced 25 years of United Nations, and later European Union funding for many projects, including financial support for touristic ventures, and training in business skills. The populace have been accustomed to receiving help for free, as well as most software in the region being pirated, the idea of paying for software is quite alien to them.

To complete this mixed methods research, a quantitative study to 500 touristic enterprises in the region is planned, so that acceptance and interest in smart tourism can be measured. After this, recommendations could be made to Government with regards to starting a smart tourism project in North Cyprus.

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Sharing Knowledge in the Processes of IS: Business Alignment

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Abstract: In the era of digital transformation enterprises incur substantial financial outlays on the implementation of increasingly modern solutions of information systems (IS). Unfortunately, enterprises often do not obtain the expected benefits since it is not the amount of outlays but the maturity of adjustment of the introduced IS to the business needs of the company that is the key determinant of the implementation success. The concept of IS-Business alignment is understood as the application of IS in matching strategies, objectives and business needs. Researchers, in their deliberations on the essence of alignment, emphasize the role of cooperation based on common thinking and the use of shared knowledge resources. Theoreticians and practitioners also agree that the higher the level of IS-Business alignment maturity the more the benefits, both financial and market ones, which strengthen the competitive advantage the enterprise gains. Among the factors which allow for better adjustment of new IS solutions to the company's needs, sharing knowledge among managers, employees and IT specialists is of great importance. The objective of the article is to identify the relationships between the factors determining knowledge sharing (KS) in enterprises and IS-Business alignment maturity. Three groups of KS factors were identified: individual, organizational and technological. The respondents recognized that organizational factors have the largest impact on KS and, in particular, creating organizational climate based on trust and motivating employees to share knowledge and organizing office space and the space favorable for informal KS, followed by individual factors, especially individual belief in the legitimacy of KS as well as strong, good employee relations with other employees inducing them to share knowledge in the company. The impact of technological factors was rated the lowest. The occurrence of substantial differences in the assessment of factors determining KS in the processes of IS-Business alignment by managers and IT specialists was also detected. In the conducted survey, the research sample was managers and IT specialists hired in large Polish enterprises.

Keywords: knowledge sharing, IS - Business alignment, organizational, individual, technological (ICT) factors

1. Introduction

The condition to achieve increasingly high levels of IS-Business alignment maturity is the continuous adaptation of IS solutions to changing business needs. Sharing knowledge is essential so that, on the one hand, IT specialists get to know business needs and, on the other, managers learn the capabilities and functionalities of new information systems. Both IS-Business alignment and knowledge sharing should be the processes implemented continuously. In enterprises, it is worth developing the models of knowledge sharing in IS-Business alignment based on the knowledge of effectiveness of these activities.

According to Chan and Reich (2007), IT-business alignment refers to the adjustment between two or more components in terms of addressing the needs, demands, goals, objectives, and/or structures of each component so that management of business and IT remain in harmony. The importance of alignment for effective organizational performance is well recognized now and recent studies continue to build on empirical evidence that reveals positive effects of alignment on business performance (Sabherwal, Chan, 2001). IT-Business alignment has been proven to provide value to the company, ranging from improving the company's effectiveness and performance, increasing competitive advantage and the return on investment and business value-IT and to maintain the company's stability (Baker et al. 2011). The higher the level of IS-Business alignment the greater the company's opportunities to achieve intended benefits from the implementation of new IS solutions.

The effects of knowledge sharing from the company's perspective can be sought both in better performance of individual tasks and the impact on the operation of the entire company. Moreover, sharing knowledge within the organization has positive impact on improving cooperation between departments, mutual learning, development of existing knowledge resources and stimulating the emergence of new ideas (Zhou, Li 2012). Knowledge sharing is also on the list of factors providing the success of project implementation (Walczak 2010).

When treating the implementation of IS as a project, an important research problem seems to be the identification of factors positively affecting knowledge sharing in IS-Business alignment.

2. IS-Business alignment

The concept of IT/IS-Business strategic alignment has been around since the 1980s and became the corporate main concern in the 1990s and it is still being developed. The research into IT or ICT alignment covers a wider context than information system (IS) alignment and can be successfully adopted to solve IS-business alignment problems. In literature, different terms are used to refer to the alignment concept, which is called fit, bridge (Ciborra 1997), integration (Weill, Broadbent 1998) or harmony (Luftman et al. 2000; Jelonek 2009).

There are different alignment definitions, multiple factors related to alignment as well as various approaches to alignment measurement. Luftman et al. (1993) define alignment as the extent to which the IS strategy supports and is supported by the business strategy. Alignment can be defined as the degree to which the information technology mission, objectives and plans support and are supported by the business mission, objectives and plans (Reich and Benbasat, 2000). However, despite the recognition of the importance of alignment, there has been little research into alignment as a dynamic process (Jelonek 2009).

Alignment research generally focuses on the company's performance, such as increased sales revenue (Kearns 2005), improved operational efficiency (Oh, Pinsonneault 2007) and enhanced financial performance and growth, such as productivity and customer benefits (Gerow et al. 2014).

Henderson and Venkatraman (1999) proposed the Strategic Alignment Model (SAM) which can be considered as the founding father in conceptualizing strategic alignment. They believe that strategic alignment is the missing link between IT and business underlying the failure of IT investments in delivering appropriate business value. Since then several alignment models have been proposed (Reich, Benbasat 2000; Sabherwal, Chan 2001). The measure of alignment is its maturity. The Strategic Alignment Maturity Model (Luftman 2003) is considered as the most comprehensive one. In this approach, IT-business strategic alignment maturity is measured based on six criteria: (1)Communication, (2)Value Measurement, (3)Governance, (4)Partnership, (5)Scope and Architecture and (6)Skills. Based on those criteria, IT-Business strategic alignment is classified into five maturity stages, which are: (1)Initial/Ad-hoc Process, (2)Committed Process, (3)Established Focus Process, (4)Improved/Managed Process, and (5)Optimized Process. In this respect, Luftman's SAMM model is a bottom-up prescriptive instrument that can be used to evaluate and improve organizational maturity in aligning IS and business.

Rathnam, Johnsen and Wen (2005), analyzing the results of studies by various researchers, summarize the reasons why IT-business alignment gaps exist and why it is so difficult to reach subsequent levels of alignment maturity. The researchers categorized the reasons using the following classifications:

Strategy

- Poor strategy development, management and communication
- No generally accepted framework for business strategy
- Lack of strategic focus within organizations - on budget, tactical plans and governance rather than company's strategic direction
- No strategy management process
- IT not involved in business strategy development process
- Business areas unwilling to include IT in strategy discussions
- IT investments not linked to corporate strategy

Tactics

- Lack of alignment between IT and business priorities
- Business attempts to determine whether to buy or build technology and how to use technology, without IT involvement
- Budgeting process treats IT as an expense rather than an asset or investment

Communication

- Difficulty in communicating technology issues

- IT staff and leadership are not effective communicators

- Poor communication between IT and business departments

Education

- Lack of business understanding among IT personnel

- Complexity and expense of technology infrastructure

- Lack of enterprise-wide perspective of staff

- Lack of understanding that IT has value beyond a method to cut costs

In response to the identified reasons for the occurrence of the misalignment gap, a range of actions can be recommended allowing for the minimization or full elimination of gaps in IS-Business alignment (more: Jelonek 2018, pp.157-158). The research problem in the article draws attention to activities related to knowledge sharing in IS-Business alignment. The above list often includes: "no knowledge", "no understanding", "no cooperation" and these are arguments justifying the significance of the knowledge sharing problem in the company, particularly in IS-Business alignment and striving for increasingly high levels of alignment maturity, which will allow the company to achieve the expected benefits.

3. Knowledge sharing as the key dimension of knowledge management

Knowledge management in enterprises (Tiwana 2000) or non-profit organizations (Lemanska-Majdzik et al. 2014) is the requirement and necessity now (Illes et al. 2013). Among key dimensions of knowledge management in enterprises the following are analyzed: locating knowledge resources, knowledge acquisition, knowledge development, knowledge sharing and distribution and use of knowledge (Illes et al. 2014).

Knowledge sharing (KS) is defined by Ipe (2003) as follows: knowledge sharing between individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed and used by other individuals. The use of the term 'sharing' implies that this process of presenting individual knowledge in the form that can be used by others involves some conscious action on the side of the individual possessing knowledge. Knowledge sharing is also defined as processes that involve exchanging knowledge between individuals and groups (Yu et al. 2010) or providing tasks, information and know-how to help others and to collaborate with others to solve problems, develop new ideas or implement policies or procedures (Wang, Noe 2010).

Knowledge sharing is divided into three generations as follows (Bellefroid 2012):

- 1. The first generation: It is a traditional way of KS and stands on the basic concept of codification and storage which is supported by information technologies (Hansen et al. 1999). Codification is used as a starting point where new employees can find out what others know and what knowledge is available.

- 2. The second generation: It focuses on the social component and personalization so that people cooperate and communicate. Mentoring, coaching or face-to-face meetings are opportunities to share knowledge (Hansen et al. 1999). Personalization is the application of the available knowledge in the organization.

- 3. The third generation: It is social networks that provide a new way to get in touch with experts and to search for knowledge outside the organization. It deals with the function of knowledge ecology, chaos and the sensing of opportunities (Scharmer 2001).

Improving the practices of knowledge sharing related to work would result in benefits for both organizations and individuals. Knowledge sharing is considered as the key activator of knowledge management and there are two aspects of knowledge sharing: the supply side and the demand side. The supply side is concerned about motivating employees to share their knowledge and gain benefits for both employees and employers. The demand side addresses the behavior of knowledge sharing among employees and knowledge acquisition by employers to enhance organizational knowledge (Mansingh et al. 2009).

Abu-Shnab et al. (2014) claimed that the importance of knowledge sharing is still arguable: while many companies think that traditional channels are safer, others have failed to notice that knowledge sharing practices

nowadays are easier than before. This lack of awareness might arise from not realizing the advantages of investing in knowledge sharing practices.

4. Factors affecting the knowledge sharing process

The research identifying determinants of success of the knowledge sharing process in the enterprise has been conducted for many years (Sveiby, Simons 2002; Ipe 2003; Mccall et al. 2008; Lee, Yu 2011). Sveiby and Simons (2002) have identified a long list of factors mentioned in the literature on culture and employee attitude that influence KS, trust and collaboration. They have highlighted attitudes among employees and teams, the KS behaviour of supervisors and organizational culture (Sveiby, Simons 2002).

A study conducted by Mccall et al. (2008) reveals that four factors influencing KS are:

- 1. Individual factor, which is closely related to one's behavior in terms of KS in relation to others.
- 2. Relational factor, which refers to individual relationships in a group.
- 3. Informational factor, which is a complex type of knowledge.
- 4. Organizational factor, which is related to emotional bond between individuals and the organization.

Ipe (2003) mentioned a different set of four major factors that influence knowledge sharing between individuals in organizations. These factors are:

- The nature of knowledge; knowledge can exist in a tacit or explicit form and has a value attributed to this, this value has a significant impact on how and whether individuals share it;
- Motivation to share; motivational factors can be divided into internal and external factors;
- *Internal factors; include perceived power attached to knowledge and reciprocity that results from sharing,*
- *External factors; include relationship with recipients and rewards for sharing,*
- Opportunities to share; can be both formal and informal;
- *Formal opportunities; include training programs, structured work teams and technology-based systems that facilitate knowledge sharing,*
- *Informal opportunities; include personal relationships and social networks that facilitate learning and knowledge sharing.*
- The culture of the work environment; the factors described above are important to understand the manner in which knowledge is shared between individuals and all of these factors are influenced by the culture of the work environment.

Furthermore, Ipe (2003) found that more knowledge is shared informally than through formal channels and much of the process depends on the culture of the work environment. Lin and Lo (2015) found that rewards and inspirations can enhance knowledge sharing among employees.

Recent developments in ICT have made it easier for organizations to interact with employees. Developments in knowledge management focused on providing electronic databases, network systems and software to encourage knowledge distributions (Chow and Chan, 2008).

The above review of the research results indicates to what a large extent the factors affecting knowledge sharing in the company are searched for. However, it should be clearly pinpointed that sharing knowledge in IS-Business alignment is specific and the implementation of new information system is always burdened with a high risk of project failure.

The authors, based on the available research results and own experiences, formulated the list of 12 factors affecting knowledge sharing in IS-Business alignment and the assessment of the impact of these factors is the focus of the presented research.

5. Materials and methods

5.1 The research problem and hypothesis development

The presented results of literature studies confirm the positive impact of knowledge sharing on the financial and market results of enterprises, on strengthening the competitive advantage of enterprises and creating value. Numerous studies also confirm the positive impact of IS-Business alignment on the results achieved by enterprises and on creating value in different areas of the company's operation.

The authors notice the lack of research into the impact of knowledge sharing in the processes of IS-Business alignment. The objective of the presented results is to fill in the identified research gap by verifying four research hypotheses.

> *Hypothesis H1: Knowledge sharing significantly and positively affects IS-Business alignment maturity.*

The success of IS-Business alignment is ensured by the cooperation of managers and IT specialists, therefore, it seems purposeful to verify if both groups of employees similarly perceive the impact of knowledge sharing on IS-Business alignment maturity.

> *Hypothesis H2: There are significant differences in the assessment of the impact of knowledge sharing on IS-Business alignment maturity by managers and IT specialists.*

The factors affecting knowledge sharing in IS-Business alignment can be grouped as: organizational, individual and technological (ICT).

Organizational factors:

- O1: Creating organizational climate based on trust and motivating employees to share knowledge,
- O2: Appointing the person/team responsible for knowledge management, including knowledge sharing in IS implementation projects.
- O3: Organizing space, providing time and creating opportunities for employees to formally share knowledge e.g. meetings in conference rooms.
- O4: Organizing office space (large open spaces) and the space favorable for non-formal knowledge sharing.

Individual factors:

- I1: Individual belief in the legitimacy of knowledge sharing as a result of participation in training in knowledge management.
- I2: Strong, good employee relations with other employees inducing them to share knowledge in the company.
- I3: Strong, good employee relations with the enterprise inducing them to share knowledge in the company.
- I4: Involvement of employees in everything they do.

Technological factors (ICT)

- T1: Providing access to solutions supporting communication: e-mail, discussion groups, forum etc.
- T2: Providing access to: databases, knowledge bases, reports, bulletins etc.
- T3: Modern, reliable IT infrastructure.
- T4: Using group work support systems.

> *Hypothesis H3: The largest positive impact on knowledge sharing in IS-Business alignment is exerted by organizational factors.*

It also seems interesting to test if managers and IT specialists similarly assess the impact of each of 12 specified factors on knowledge sharing in alignment.

> *Hypothesis H4: There are significant differences in the assessment of factors determining knowledge sharing in IS-Business alignment by managers and IT specialists.*

5.2 Data collection method

The research procedure assumed conducting a survey questionnaire among randomly selected enterprises. The survey questionnaire included 14 questions and the demographics. The questionnaire was verified in test trials on a group of 10 respondents. This study related to large companies because of better availability of data on those firms and, generally, larger firms are more information-intensive and practice strategic alignment more actively. Large enterprises employ over 500 workers while conducting production, trade or service operations in different industries. The sampling framework was based on the database of large enterprises generated randomly by the system out of the commercial Binsode database (Marketing Module). The sampling scheme was probabilistic - simple random selection. The research was conducted using the CATI method (computer-assisted telephone interviewing) in 2018. The issues of the complete research included the topics of information systems in the perspective of the strategy, alignment and value creation (Jelonek 2018).

The surveys come from 68 enterprises. In each company, the questionnaire was completed by two respondents: a manager and an IT specialist. The sample contains 135 questionnaires filled in by 67 managers and 68 IT specialists (1 incomplete survey was rejected).

5.3 Research findings

The results of the analysis of the respondents' responses to the question whether, and if so, to what extent knowledge sharing positively affects IS-Business alignment maturity are presented in Table 1.

Table 1: Descriptive statistics: the impact of knowledge sharing on IS-Business alignment maturity.

	N	Mean	SD	Median	Min.	Max.
The impact of knowledge sharing on IS-Business alignment maturity	135	4.10	0.737	4.00	3.00	5.00

The high average rating (4.10) of the impact of knowledge sharing on IS-Business alignment maturity allowed for a positive verification of Hypothesis 1.

Table 2 contains the results of the Mann-Whitney U test applied to verify Hypothesis H2 assuming there are significant differences in the assessment of the impact of knowledge sharing on IS-Business alignment maturity by managers and IT specialists.

Table 2: The results of the Mann-Whitney U test: *the impact of knowledge sharing in the company on IS-Business alignment maturity* and the assessment of managers and IT specialists

Variable	Average rating		Z	p
	managers	IT specialists		
The impact of knowledge sharing on IS-Business alignment maturity in the company	4.20	4.00	-2.285	0.022

The results confirmed Hypothesis H2 that there are significant differences in the assessment of the impact of knowledge sharing on IS-Business alignment maturity by managers and IT specialists.

In the subsequent questions of the questionnaire, the respondents assessed the impact of knowledge sharing factors on IS-Business alignment. The following scale was used: 1 – "no impact", 5 – "significant impact". The factors were classified into three groups: organizational, individual and technological (ICT). The assessment of the impact of each group of factors was made on the basis of the percentage summary of the amount of indications of individual ratings for the factors. Table 3 contains the summary of the analysis of the ratings of factors affecting knowledge sharing in IS-Business alignment in large companies.

It was assumed that both the rating of 5 and 4 mean that the specific factor positively affects knowledge sharing in w IS-Business alignment, therefore, these responses can be summed up. The analysis of the distribution of the ratings of factors influencing knowledge sharing in IS-Business alignment in large enterprises indicated that organizational factors obtained 71% of the ratings of 5 and 4, which means that the respondents acknowledged that they have the largest impact on knowledge sharing in IS-Business alignment, thus Hypothesis H3 was positively verified.

Table 3: Factors affecting knowledge sharing in IS-Business alignment in large companies

Rating scale	Factors affecting knowledge sharing in IS-Business alignment		
	Organizational	Individual	Technological (ICT)
Rating 1	11%	12%	16%
Rating 2	9%	12%	21%
Rating 3	9%	13%	10%
Rating 4	32%	37%	33%
Rating 5	39%	26%	20%

The respondents assessed the impact of each of 12 factors on knowledge sharing in IS-Business alignment using the aforementioned scale of 1 to 5. Table 4 contains the results of the Mann-Whitney U test for the group of managers and IT specialists.

Table 4: The results of the Mann-Whitney U test: the factor impact on knowledge sharing in IS-Business alignment in the company and the assessment of managers and IT specialists

Variable	Average rating		Z	p
	managers	IT specialists		
Factor O1.	4.23	3.98	-3.04691	0.002312
Factor O2	4.10	4.00	-1.33079	0.18326
Factor O3	4.12	3.98	-1.81295	0.06984
Factor O4.	4.06	4.34	-2.01794	0.043599
Factor I1	4.1	4.32	-2.19778	0.027966
Factor I2	4.24	4.06	-2.28534	0.022293
Factor I3	4.05	3.89	-1.80981	0.070326
Factor I4	4.00	3.87	-1.38683	0.165494
Factor T1	4.00	4.16	-2.19464	0.02819
Factor T2	3.98	3.88	-1.33069	0.183292
Factor T3	3.88	3.75	-1.51743	0.129159
Factor T4	3.95	4.13	-2.05137	0.040232

Hypothesis H4, that there are significant differences in the assessment of factors determining knowledge sharing in IS-Business alignment by managers and IT specialists, was confirmed for 6 out of 12 variables. This applies to the assessment of the impact of the following factors of knowledge sharing in IS-Business alignment:

O1: The impact of creating organizational climate based on trust and motivating employees to share knowledge (Z = -3.04691, p = 0.002312).
O4: The impact of office space organization (large, open spaces) and the space favorable for informal knowledge sharing (Z = -2.01794, p = 0.043599).
I1: The impact of individual belief in the legitimacy of knowledge sharing as a result of participation in training in knowledge management (Z=-2.19778, p=0.027966).
I2: The impact of strong, good employee relations with other employees inducing them to share knowledge in the company (Z=-2.28534, p=0.022293).
T1: Providing access to solutions supporting communication: e-mail, discussion groups, forum etc. (Z=-2.19464, p=0.02819).
T4: Using group work support systems (Z=-2.05137, p=0.040232)

The other results indicate there are no significant differences in the assessment of the factor impact on knowledge sharing in IS-Business alignment. For all the respondents, organizational activities concerning appointing the person/team responsible for knowledge management, including knowledge sharing in IS implementation projects were important as well as the organization of space, providing time and creating opportunities to share knowledge, e.g. meetings in conference rooms. In the group of individual factors, there was agreement as for the assessment of the impact of strong, good employee relations with the company and employee's involvement in everything they do. In the group of technological factors (ICT), ensuring the access

to: databases, knowledge bases, reports, bulletins etc. was rated similarly as well as the provision of modern, reliable IT infrastructure.

6. Discussion and conclusions

The results of the conducted research allowed for the positive verification of Hypothesis H1 that knowledge sharing positively and significantly affects IS-Business alignment maturity. The identified differences in the perception of both the significance of the process of knowledge sharing for IS-Business alignment (Hypothesis H2) and factors positively influencing this process (Hypothesis H4) by managers and IT specialists should be reduced so that the common strategy for IS-Business alignment can be developed.

The research indicated that both managers and IT specialists very highly assess the significance of organizational factors for the effective course of the process of knowledge sharing in IS-Business alignment (Hypothesis H3). The analysis of the research results also allows for the formulation of the following conclusions:

- Significant impact of organizational factors was indicated slightly more often by managers - 54% of the ratings of 5 and 4 than by IT specialists.

- Individual factors obtained 63% of the ratings of 5 and 4, which means that the respondents consider them as important and appreciate their role in knowledge sharing in IS-Business alignment.

- Managers were more convinced about the impact of individual factors on knowledge sharing in IS-Business alignment than IT specialists and provided 72% of the ratings of 5 and 4.

- Technological factors obtained the smallest number of ratings of 4 and 5, since only 53%, but this result means that more than half of the respondents think that ICT solutions have large positive impact on knowledge sharing in IS-Business alignment.

- 71% of IT specialists claimed that ICT factors have significant impact (the rating of 5) on knowledge sharing in IS-Business alignment.

- IT specialists assess higher or even glorify the significance of technological factors (ICT), including providing access to solutions supporting communication: e-mail, discussion group, forum etc.

The presented conclusions should be the guideline for managers what actions to take to make the process of knowledge sharing in IS-Business alignment bring the greatest benefits for enterprises.

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Knowledge Management: A Human Attribute

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Abstract: Knowledge can be defined as what we know – which is somewhat intangible – it is an all-encompassing term that is used both in academia and the business environment. For the purposes of this paper the perspective taken here is that knowledge involves the cognitive / mental process of understanding, comprehension and learning i.e. that set of activities that goes on in the minds of individuals. The paper discusses both the subjective and objective view of knowledge, using the four paradigms of information systems development model (Hirschheim & Klein's 1989) and isomorphism (DiMaggio & Powell, 1983) as mechanisms to explain why knowledge is polysemous, influenced by multiple logics and represents complexity and is therefore a human attribute as opposed to an objective tangible resource or organisational differentiator. The conclusion focusses upon managing individuals, recognising their contribution, which in turn manages the knowledge within individuals and subsequently knowledge that resides within organisations.

Keywords: knowledge as a human construct, knowledge management, perceptual mapping, polysemous, isomorphism and hollow strategies

1. Introduction

Philosophical Understanding of knowledge

Knowledge is defined as what we know – it involves the cognitive / mental process of understanding, comprehension and learning that goes on in the mind – What puts all of this discussion into perspective is a simple yet meaningful statement, which has been the tenets of much of my understanding, and can be encapsulated quite simply by the following quote:

> *the existence of a world without the mind is conceivable, [but] meaning without a mind is not…*

> *(Crotty, 1998: 10)*

The assumption identified is that there is a world external to our knowing of it; however our knowing of it is dependent on the ability to construct meaning. It is people/individuals who create such meaning and hence, collectively, their shared social world. If one then aligns with this statement it identifies that one accepts a world and things in that world, can exist independently of our consciousness of them but it does not imply meaning exists independently of consciousness, as one would find within the realms of scientific realism. This then privileges that the world exists without consciousness but it only becomes a world of meaning when meaning-making beings make sense of it. This process of sense-making or knowing about this world, or to create meaning occurs through that process of the mind. Whereby, one understands the world through engagement with the realities of that world i.e. meaning is constructed it is not discovered as in *what we know*, and *what kinds of knowledge are possible and how can one ensure that they are both adequate and legitimate* (Maynard, 1994: 10). Ultimately meaning resides within individuals and different people or individuals may construct meaning in different ways even in response to the same phenomenon based on their experience, understanding, multiple logics and world perspective. However, business takes a much more objective view of knowledge, in that, knowledge is seen, recognised and referred to as the differentiator for business, Webster (2014) argues *information [knowledge] is regarded as the distinguishing feature of our world*. However, business take this literally to mean that knowledge is something they can use, manage, manipulate and benefit from – what the author proposes via the discussion is that knowledge is not like this but is in essence a human attribute. What businesses are actually dealing with, collecting, manipulating and storing is not knowledge but is in fact data. This then sets the scene for the business community to recognise that knowledge is an important aspect of differentiation but that knowledge is not there waiting to be used but it is the individual(s) that make sense of this. Knowledge is not resource like land, labour and capital, *it is not a resource to be stockpiled as one more factor of production …. It is not a commodity. It is a skilled human accomplishment* (Boland, 1987: 377). The corollary of this approach is that it minimises the role that individuals play within whole data, information and knowledge process. Therefore knowledge is not a resource, as inferred by some, but a process as inferred by others, suggests that there is potential for confusion and ambiguity regarding the notion of knowledge and how

to manage it. It is this ambiguity that maintains the difficulty in managing knowledge and in businesses benefiting from it as a mechanism to differentiate themselves from their competitors.

What is knowledge is not a straight forward question as Hislop (2005: 15) identifies '*what is knowledge' represents one of the most fundamental questions that humanity has grappled with, and has occupied the minds of philosophers for centuries*. Similarly, knowledge is not a new or a predominantly 21st century concept; it is however, a topical term, more so with the introduction and increased fascination, since the 1990s, with knowledge management. This interest, in knowledge and knowledge management practices, is identified in both business and educational establishments (Mandelson, 2009; Warhurst & Thompson, 2006). Hislop (2013: 3) infers that *economies and society in general have become more information and knowledge intensive* in line with this is the fact that information and knowledge based industries have replaced the traditional manufacturing industries as major employers and wealth generators (DeFillippi et al., 2006; Neef, 1999). Taking this post-industrial society view, there is a seemingly high reliance on knowledge as a key resource (Bell, 1973). In fact, Bhatt (2002: 31) argues that *organisations should be efficient at managing knowledge* but what is this concept - 'knowledge'? Stenmark (2002: 1) states that *ever since the ancient Greek period, philosophers have discussed what knowledge is*. A common usage of the term knowledge *is as the antithesis of ignorance*, (Bawden, 2001: 95), which signifies that no one wants to be ignorant, therefore we all seek knowledge. Davenport (1997: 9) argues *that knowledge is information with the most value and is consequently the hardest form to manage*. Just as information and data have different interpretations so to can knowledge Hislop (2005: 13) *argues that there is enormous diversity in terms of definitions relating to the term knowledge* this is based on individuals' *descriptions of and conceptualisations of knowledge*. There may in fact not be one true definition of knowledge but an amalgamation of many different views. Therefore, viewing 'knowledge as truth' (McAdam & McCreedy, 2000) where knowledge allows one to create generalisations and law like truths is not necessarily appropriate for this ubiquitous concept.

2. Research approach

The research approach was based on access to senior institutional members, responsible for formulating an information strategy. Meetings were recorded and annotated, senior individuals were interviewed on a number of occasions both for information and approval of transcript material based on the subject of constituent parts of an information strategy. Individual responses were aligned with overall themes. The themes were a result of analysing a set of interview transcripts, coding responses and aligning those responses through the process of thematic analysis. All of which allowed the use of the four paradigms of information system development to identify how and why individuals interpreted data, information and knowledge.

3. Strategy formulation process

When undertaking developmental work often the starting point is that of a strategic focus or approach to achieving that end purpose. Businesses are comfortable with objective, measureable or physical objects they are less understanding with conceptual non tangible elements. One way of raising and explaining these issues is by recognising that there are different disciplines within organisations and these discipline have influencing aspects – i.e. management, project management, accounting, law, human resource management disciplines for example. In recognising these underpinnings it allows one to explanation why individuals may interpret information in a particular way and act in a particular fashion; this is seen clearly in the implicitness of an information strategy within other strategies. One mechanism for explaining discipline underpinnings is that of Hirschheim and Klien's (1989) four paradigms of IS development model (*Appendix 1*). Where the concept of a paradigm relates *to the most basic fundamental set of assumptions adopted by a professional community that allows its members to share similar perceptions and engage in commonly shared practices* (Hirschheim and Klien, 1989: 1201). The important aspect here is that the concept of a paradigm identifies assumptions with regards to knowledge i.e. how is knowledge acquired and how does one understand that world to which this knowledge relates. The four paradigms highlighted by Hirschheim and Klein, 1989, are split across two dimensions: subjectivist and objectivist, and order and conflict. The assumption the researcher makes is that depending on the way that one acquires, perceives or understands the concept of information and/or knowledge will impact on actions, decisions, systems development and strategy formulation. This equates the concept of how individual's understand or interpret the notion of knowledge with how they acquire it, create it, use it and formulate it into decisions and actions; explaining the polysemous nature of knowledge and its impact. Prior to using Hirschheim and Klein's model it was important to acknowledge that individuals are influenced by a variety of discipline driven priorities – clearly seen within the likes of librarianship, Information technology accounting,

management and law disciplines. These were initially identified through the use of isomorphic templates – mimetic, normative, and coercive (DiMaggio & Powell, 1983) and were used to identify individual perspectives in relation to knowledge based on their backgrounds or elected affinities with three distinct areas:

▪ **Firstly** – Information & knowledge was identified as a resource, it is codifiable, transferable, it can be easily stored and shared. The aim is to provide access to this information/knowledge showing a strong focus on the technology to support knowledge dissemination and manageability – **information technology perspective**.

▪ **Secondly** – Knowledge is used as a mechanism for managing, monitoring, and controlling organisations. It is an important asset – **General management perspective**

▪ **Thirdly** - The custodians of information and knowledge for all. Access, storing, retrieving, and sharing information/knowledge are paramount in maintaining their control over the resourced based documentation, text, journals, books, electronic libraries, knowledge resources – **Library Science perspective**.

What this initial process identified was that individual disciplines have their own unique requirements and characteristics but shared the same operating environment – that of a university. It also became evident that there was disagreement between disciplines based on their perception and management of knowledge which then created a situation of reverting to 'known quantities' that is that of their individual discipline professional alignments. As there was no clear understanding or agreement within the strategy formulation committee; individuals were drifting towards socially and/or professionally accepted views, on the basis that there was an absence of direction from within the committee itself. Analysing this 'absence' or 'drift' suggests that individuals were copying what was 'out there' either in the form of the 'external consultants' material, or internal processes and documentation or from other outside bodies or institutions; this resulted in a default position that aligned with either their professional body, or with written guidance from outside bodies or other institutions. Once the underpinnings of specific disciplines were identified the researcher then transposed these onto Hirchheim and Klein's model as identified below – this allowed a clear discussion with the strategy formulation committee on why movement forward was not occurring.
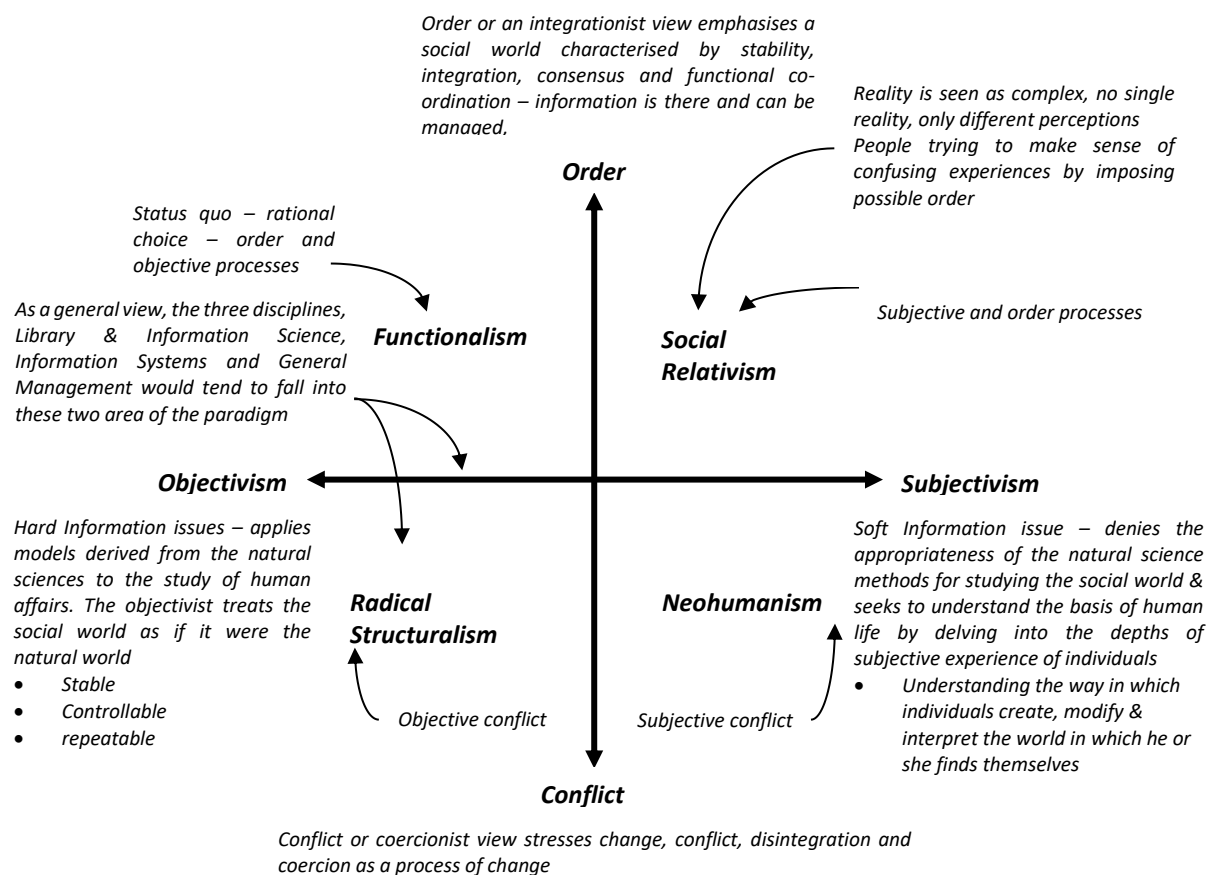
Figure 1: Hirschheim & Klein's (1989) four paradigms of information systems development model – adapted

The relevance of individual's perceptions, actions and understanding of knowledge and a mechanism for managing knowledge is further identified. Where members of the strategy formulation committee are positioned specifically based on their expressions and articulation of what they identified as being knowledge and in doing so identifying the polysemous nature of knowledge, the influence of multiple logics and the complexity found within the environment of higher education towards the strategy formulation process when dealing with non-tangible issues. Recognising that there is an inherent objective view of knowledge found within committee members, that they maintain their discipline views but fail to recognise the alternative perceptions of knowledge and therefore to fail to acknowledge the polysemous nature of knowledge and formulating/managing knowledge becomes problematical.

Definitive end-product, order, clarity, logical sequence

Interviewee(s) G, E

Interviewee(s)I, K, H

Interviewee(s) B

Hard Information Issues - objectivism

Soft Information Issues - subjectivism

Information issues – information is seen as a human activity. There is not a step by step approach but more of a continuous circle where one needs knowledge to generate data, which in turn adds to one's understanding and so the process continues.

Hard Information issues information is seen as a resource that can be codified, shared, stored and therefore sees knowledge

Information

Interviewee(s)M, P,J, C, A, D, O, N

Interviewee(s) F

The aim is to understand the way individuals creates, modifies, and interprets the world in which he or she finds themselves

Interviewee Q

intangible – conflict, confusion, personal agenda

Figure 2: Perceptual mapping of the strategy formulation committee

What this analysis signifies is that the majority of individuals within the strategy formulation committee are aligned with specific disciplines and so have a strong tendency towards a very descriptive, logically sequenced, hard interpretation of knowledge issues. This creates a significant issue when trying to formulate a strategy or implement processes to manage knowledge; given that it has been argued that knowledge is a subjective human construct, it is intangible and not the same as other organisational resources. There is clearly a tendency for strategy formulation committee members to take a very hard, objectivist view of knowledge and therefore that view is aligned and carried forward in the approach and formulation of any specific strategy regarding knowledge. Interestingly, the analysis identifies a 'lone voice' that of interviewee B whereby feedback indicated there may be more to the notion of knowledge than is currently being voiced by the committee members.

4. Hollow strategies

The outcome from this initial phase of the research process has highlighted a number of issues. The fact that there seems to be evidence to suggest that not only is there an objective and implicit alignment with knowledge and its strategic use but that this alignment is misplaced as it fails to recognise the subjective human construct of knowledge. The result of an objective and implicit approach to knowledge and knowledge management strategy formulation manifests itself in the realisation that the knowledge management strategy is in fact a 'hollow' strategy. Much of what the researcher has identified within the research process indicates that those involved in the knowledge management formulation process were themselves not totally in agreement with what constitutes a knowledge management strategy. The researcher would add that a knowledge management strategy has still not materialised in terms of how it was initially construed. It still has not aligned with the notion

of knowledge creation and focusses upon technology and knowledge as a product; and it does not recognise the role of the individual in the process. It still 'floats' within the general structure of organisational strategies and infers little development has occurred. The researcher would suggest that many institutions have 'paper based' documents but they are nothing more than an ineffectual document or 'hollow' strategies. Given the contextual setting within which the information strategy is located, i.e. universities where a constant role of programme, module and institutional validation occurs it is not unreasonable to find this type of approach to a particular strategy formulation process. It is often the case that institutions have produced strategies that have been *seen to be written* but not *written to be seen*. The case study investigation has clearly acknowledged that no real formal or useful strategy was forth coming and that in the end the whole process was subsumed into another strategic committee – leaving the whole notion of knowledge and knowledge management in the ether.
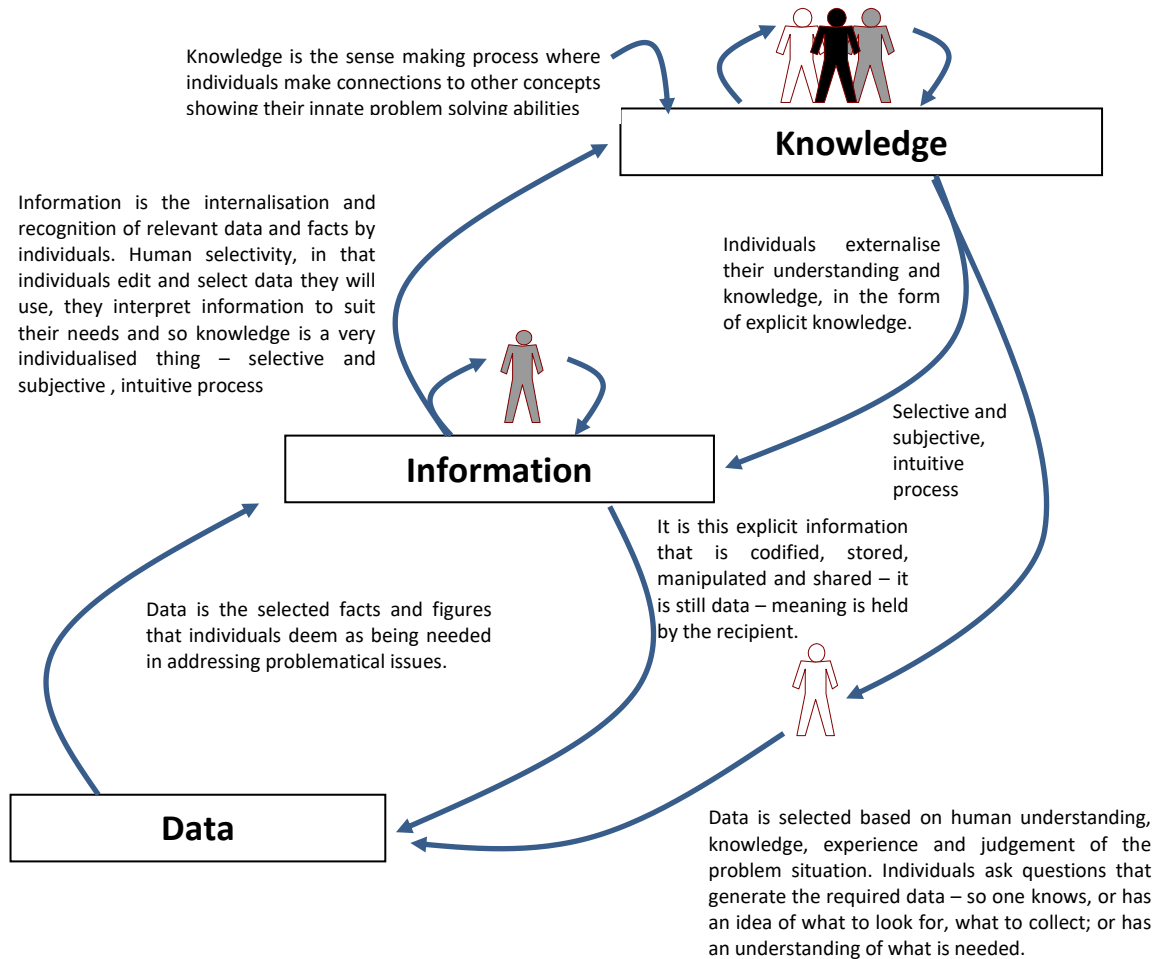
(Adapted from Knox 2007 and Knox 2009)

Figure 3: The data, information and knowledge hierarchy as a human construct

What the researcher can identify from both the literature and the case study material is that the need to manage knowledge is pervasive across all aspects of the organisation. Therefore, the notions of data, information and knowledge are implicit in all activities whether they are strategic or operational. The former would suggest that information about future actions, forecasting scenarios or knowing what your competitors are doing. General Management (GM) require this type of information/knowledge to make decisions regarding where to go next or what actions to take; and much of this information is reliant upon access to sound data/information that is produced by technology. This infers a strong relationship between information and technology which in turn general management use in decision-making and managing the organisation. The latter also has a requirement to access information but more in terms of the internal aspects of the organisation. Something that general management would indicate is harder to 'copy' and so provides advantage over their competitors. Information is again identified as a by-product of technology and focusses upon internal costs and operations. Whether

information is for external or internal activities there is an assimilation between information and technology as the mechanism to manage that process. The researcher would argue that this is only part of the process and that in effect this resourced based view minimises the role that individuals play within the data, information and knowledge process.

5. Outcomes

The outcome of the work to date indicates that strategy formulation committee members have a similar understanding of what a strategy is, in that they view it as a mechanism for managing a resource in this case knowledge. However, their understanding of knowledge and therefore a strategy to manage it seem not to coincide resulting in a default position being taken of assimilating the use of technology to manage knowledge, with the corollary that knowledge and its management is implicit in other strategies. Indicating that their objective view of knowledge may align but the content of the strategy may not. This is, they interpret what is knowledge quite differently but agree on it being seen as a resource. These informal disagreements could be argued, are based upon the influence of isomorphic templates pulling individuals in different directions. The recognition of an objective and implicit approach to the strategy formulation process in managing knowledge seems to be established; as well as an understanding of how isomorphic templates influenced individuals. What was less well identified and became evident from the research process was the fact that individuals were not willing or seemed oblivious to other views and were unable to adapt their own professional templates to integrate competing discipline views. This signifies that individuals and organisations were unable to 'break away' from the technological thinking or understanding that has dominated much of the discourse surrounding the notion of knowledge management. The need to 'humanise, the concepts of knowledge, as seen in *figure 3*, are an important movement forward in understanding how knowledge and knowledge strategy formulation can contribute to organisational development. Not to do so minimises the role and importance that individuals play within the management of knowledge. Not recognising or understanding that knowledge is not a tangible resource and so requires an alternative approach; not recognising individuals and their contribution, not supporting their engagement and development will continue to create problems within the business environment and ensure that knowledge is not managed, not used to differentiate and misses the huge benefit that organisation crave in being individualistic and setting themselves apart from the competition.

STABILITY
Consensus and Functional Coordination, Order

OBJECTIVIST
Hard Information – natural sciences to study human affairs methods and models

Assumption of an orthodox approach to IS design and understanding. Properties that exist, not necessarily reflective of reality.
- Outcome driven, ends means approach
- Management – leadership that knows the end
- One reality that is measureable
- Information strategy is about a strategy that assists management to achieve ends – management of information

Reality is complex, no single reality, only different perceptions. People try to make sense of confusing experiences by imposing possible order. Subjective experience maybe simply a reaction or induced by enculturated habits or by circumstances. Management instil commitment to organisation mission, this may emerge through social interaction – this didn't happen at Stapleford University.

SUBJECTIVIST
Soft Information Issues

Radical Structuralism (objective/conflict) over throw or transcend the limitations placed on existing social and organisational arrangements – focussed on structure and analysis of economics, power relationships.

Neohuman – radical change, emancipation, potentially emphasises the ole that different social & organisational forces play in understanding change – ideology, power, psychological assumptions

CONFLICT
Coercion, Change, Disintegration

Figure 4: Hirschheim and Klein's (1989) Four Paradigms of Information Systems Development - Researcher's interpretation

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Recruitment Preferences in the Skills of job Seekers: Knowledge Management Perspective

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Abstract: This paper provides qualitative research evidence on skills priorities in recruiting and selection of new employees. The adaptation of organizations to changing external environment is a topic that is currently explored and presented from different points of view. Human resources and human capital are topics of resource-based approaches to obtaining sustainable competitiveness. In particular, the issue is the ability to efficiently acquire and exploit knowledge and support a knowledge culture to promote the innovativeness and progress of organizations. Today, great attention is devoted to technical and IT skills, or creativity, under the influence of ongoing technological change driven by the Fourth industrial revolution. The goal of our survey among recruiters and human resource managers on a sample of 200 businesses was to identify priorities among the thirteen skills and abilities. The research was conducted in 2018 through questionnaire distributed directly to HR managers. The results are analyzed from the point of view of competences of the knowledge workers as well as the concept of the learning organization. The research paper analyzes different approaches and priorities devoted in companies looking for employees for a short period (for less than two years) and for companies looking for employees for a longer period of time. Advanced statistical methods have been used to compare individual sample groups of companies to identify significant statistical differences in the approach to skills preferences for new employees. Although human capital is an object of interest in the knowledge management, the distribution of knowledge among employees within the organization is considered to be its core activity. Positive finding of the research is the high priority of companies in team skills and ability to learn in selecting new employees. On the contrary only a small proportion of companies surveyed concerned technological and IT skill as key when recruiting new employees.

Keywords: soft skills, hard skills, recruitment, knowledge management, learning organization, ability to learn

1. Introduction

The success of any organization is dependent on several factors among which human capital plays the key role. Quality of human capital is directly affected by the ability of organization to get the right people necessary for knowledge sharing. Knowledge supports all the elements of an organization (Rastogi 2002) and can be understood as a set of experiences, skills, values, competencies, and so on, that predetermine individuals to perform a particular action (Davenport and Prusak 1998). The systematic formation and management of knowledge is the core of knowledge management, while the literature on knowledge management points to the importance of people in the processes of knowledge creation or knowledge transfer. Several authors have pointed out the necessity of particular attributes of people that are the enablers of knowledge creation and flows, for example leadership, adaptability or networking (Davenport, De Long and Beers 1998, Hasanali 2002). The leadership abilities of managers play a key role especially in encouragement of communication, collaboration, creativity or training and learning among employees. Another crucial aspect of effective knowledge management is that competences of individuals need to be adaptable to business changes and new situations. Effective knowledge management is thus closely related to the attributes of individual people in the company and therefrom resulting capabilities. In the context of dynamics of the environment and the effects of Industry 4.0, knowledge management is increasingly important for all kinds of organizations, namely because knowledge leads to increase in performance, innovation and competitiveness (Lee et al. 2016). Our research paper is focused on perceived key competences and skills of jobseekers by HR managers. Especially with the ongoing changes in the business environment we aim to determine which skills of candidates are perceived as most important in recruitment process. The conducted analysis focus on identifying if the attitudes of HR managers are similar or different between sectors, company sizes or based on the length of employment. Our findings are interpreted in the context of knowledge management and knowledge economy and present important findings for companies as well as jobseekers and education institutions.

2. Literature review

Knowledge is generally perceived as a key asset for achieving and maintaining competitive advantage (Lai and Lee 2007), which leads companies to focus on gaining the right knowledge through recruitment and selection processes (Herstad et al. 2015) as well as managing the existent knowledge and creating new one.). It has been stated by many authors, that knowledge management and the outcome of knowledge are closely linked to innovation, its speed and flexibility (Coombs & Hull, 1998; Darroch & McNaughton, 2002). New knowledge for innovation can be fostered by employees´ abilities especially their abilities to learn as well as their creativity (Carneiro 2000). Here plays the key role the human resource management and its practices. By the key HRM functions of personnel planning, recruitment and selection the HRM is responsible for providing the organization with new knowledge, however nowadays many companies delegate the responsibilities to line managers or even team leaders (Storey 2007).

The role of recruitment processes is very important, because it brings the potentially qualified job candidates to the selection process. The capabilities and knowledge brought to the organization depend on who is attracted by recruitment process (Henry and Temtime 2009, Gamage 2014). Whether it is a newly created position or replacement, HRM must align with organizational goals and strategies in the process of recruitment and selection. Based on the mutual understanding and alignment on objectives of work position between HR and organizational strategy, the competence requirements on potential candidates should be set. Competence of employees is a combination of one´s skills, knowledge, work results and motivations (Moore et al. 2002). The skills, knowledge and capabilities of employees together with effective training and development are linked to productivity, flexibility or financial outcomes, but also to the innovation activity and performance of the organization (Laursen and Foss 2003). In order to achieve competitiveness and organizational goals, it is inevitable to possess as well as shape skilled workers who have capabilities and potential to do their job which is the primary focus of HR management practices (Collins and Clark 2003).

Concerning one´s skills, a distinction is made between soft skills and hard skills. Although hard skills are still important, especially in relation to technological change and digitization, they are not enough to find work and long-term work success (Staffan 2010, Gibson and Sodeman 2014). From the employers' point of view, hard skills are less important for the applicant's employability than soft skills. Employers are influenced by the dynamic environment and therefore are looking for employees whose soft skills such as flexibility, critical thinking, time management, effective communication, teamwork and so on will contribute to the efficient running of the organization (AbuJbara and Worley 2018). Similarly, Yedeck and Goldstein think companies seek for individuals who can deal with conflict and are able to gather and share information (Zedeck and Goldstein 2000).

 According to Germain soft skills can be described as personal habits, attitudes and attributes that influence one's behavior and can make someone to be an effective worker and co-worker (Germain 2012). Many authors add that soft skills are important capabilities for leaders and managers (Davis and Muir 2004, Deming 2017). The importance of soft skills also results from the fact that they are difficult to observe and measure, whether for employees or job seekers from the perspective of HR workers. Hard skills, on the other hand, are easier to observe and measure, and are easier for the organization to train and educate, and they do not need a change in one´s behavior when trained compared to soft skills (Ibrahim et al. 2017). However, independent hard skills and technical abilities without interpersonal and soft skills can hinder the career development of employees (Klaus 2010). Soft skills on contrary can be applied in all kind of jobs (Robles 2012).

Soft skills and their identification among job seekers are today a key challenge for employers and HR workers. At the same time, the selection of employees with the appropriate set of skills is part of talent management, and makes it possible to distinguish between employees with high and low potential (Hopkins and Bilimoria 2008). Findings of Hambur et al. show, that employers mostly focus on those skills of candidates that will help their organization function (Hambur et al. 2002). Most valuable employees are those that can grow and learn together in line with the business change and transformations (Prescott 2004). According to several authors, companies are nowadays struggling to find employees that can communicate clearly, take initiative, problem-solve or have critical thinking especially among young job-seekers and graduates (Davidson 2016, Clarke 2016). Teamwork skills as important type of soft skill are becoming more and more important for employers (Hartenian 2003), not only because it is related to better performance and innovation, but restructuring the organizational structure to team and multi-team systems is a current trend in many industries (Deloitte 2016). Teamwork also

contributes to the training and development of soft skills especially interpersonal, leadership and communication skills (Wesley et al. 2017).

In the context of knowledge organizations soft skills play an important role in creating, capturing and utilizing knowledge. According to study by Yahya and Goh the training should be focused on leadership skills, creativity, problem solving skills and quality initiatives in order to develop employees who are capable of tapping information whether it is internal or external and turn it into organizational knowledge (Yahya and Goh 2002).

3. Materials and methods

The aim of this research was to analyze the preferences of HR managers in job seekers´ skills and to examine the differences in industry and service sectors as well as based on employment length perspective. The research was conducted on 200 Slovak companies in 2018, with research tool of questionnaire and personal interviews with HR managers. The sample consisted of HR managers representing companies from all company sizes, maturities as well as variety of sectors. The HR managers where addressed by person in three parts of Slovakia in order to cover different regions of operation. In the questionnaire we distinguished between industry, wholesale/retail, services, business shared services, IT and other different sectors. In this study we mainly aimed at comparing industry and service sectors as two different groups, while in Slovakia industry (mainly automotive) is a very important employer in a constant seek for job candidates. Thus we aimed at identifying if there is a different set of key skills desired by industry sector compared to service sectors. This comparison is of high interest for many countries, especially industrial, where the impact of Industry 4.0 will strongly effect the needed skills for future.

The main research question was *"Which of the following skills do you perceive as key in candidates?"* where respondents could choose four best suiting options by answering YES/NO. The options represented a range of soft skills that include the most required by employers and also hard skills namely technological and IT skills in reflection to ongoing technological change and digitalization. The aim of this question was to identify which skills are considered as most important for HR managers on the sample of 200 Slovak respondents. At the same time based on categorization, the research analysis was focused on analyzing and identifying differences among companies surveyed. First categorization was based on sector analysis, by comparison of industry sector and sector of services. Second categorization was based on the length of employment, in the context of for how long plans the employer to employee potential candidates. We have compared respondents who plan to employ for less than one year to those who plan to employ for more than three years. For statistical analysis we have used non parametric Chi square test to identify the significance of differences between sample groups analyzed, $\chi^2 = \sum_{i=1}^{n} \frac{(O_{ij}-E_{ij})^2}{E_{ij}}$, tested at significance level of 95 per cent, $\chi^2_{0.05} \geq 3.841, (r = 1)$. For the analysis of dependencies among key skills of candidates perceived by HR managers in recruitment and selection, Pearson correlation analysis was used to identify these dependencies.

4. Results

The main distribution of answers of respondents presented in Figure 1 shows that for 67 per cent of companies perceive ability to think and learn of a candidate as a key skill, followed by teamwork and analytical thinking. All of these belong to soft skills. Interestingly the least required skills from the point of view of HR managers in recruitment and selection process are Technological and IT skills (13 per cent), Ability to argue and persuade, Critical thinking (both 15 per cent) and Presentation and communication skills (17 per cent). This directly shows, that hard skills are less perceived as key in candidates than soft skills.

Further we have looked at analyzing the differences between industry and services. The sample group consisted of 109 companies that selected industry as the sector they operate in and 55 services as sector they operate in. Following Figure 2 presents the comparison of industry and services based on the difference from average assessment. Largest differences that can be observed are in soft skills of customer orientation, which is much more perceived as key in candidates for services. On contrary creativity and creative thinking is more perceived as key for industry. Other high above average assessment is observable for service sector in ability to argue and persuade, critical thinking and presentation and communication skills. There is not found any large difference in hard skills between industry and services.
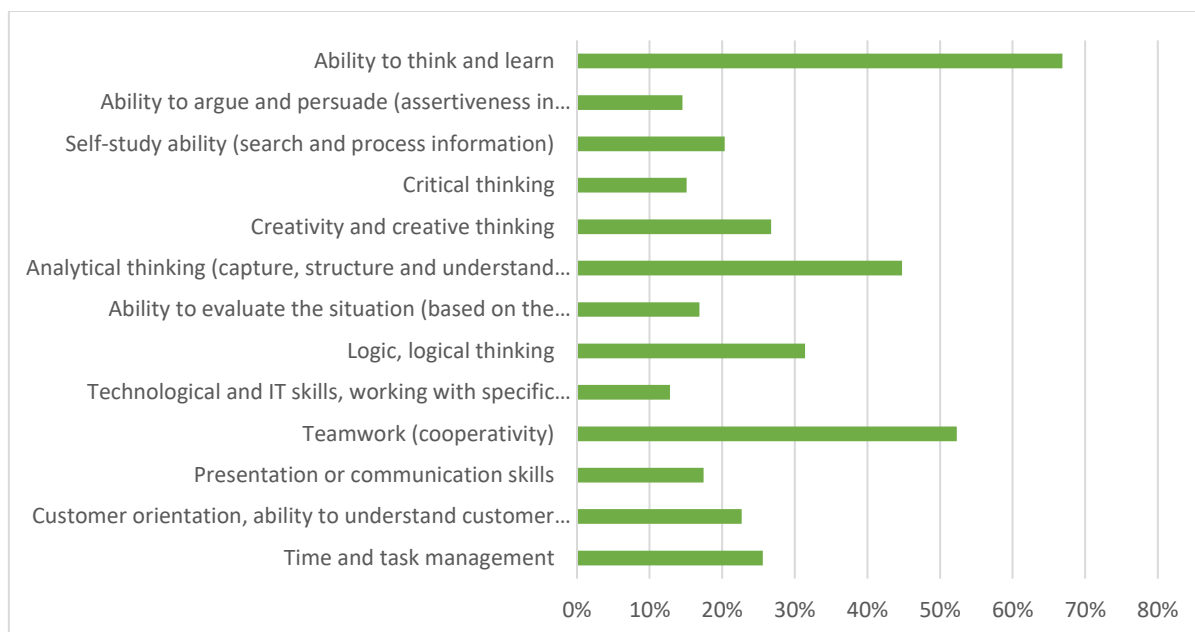
Figure 1: Percentage of companies that perceive selected skills as key in candidates
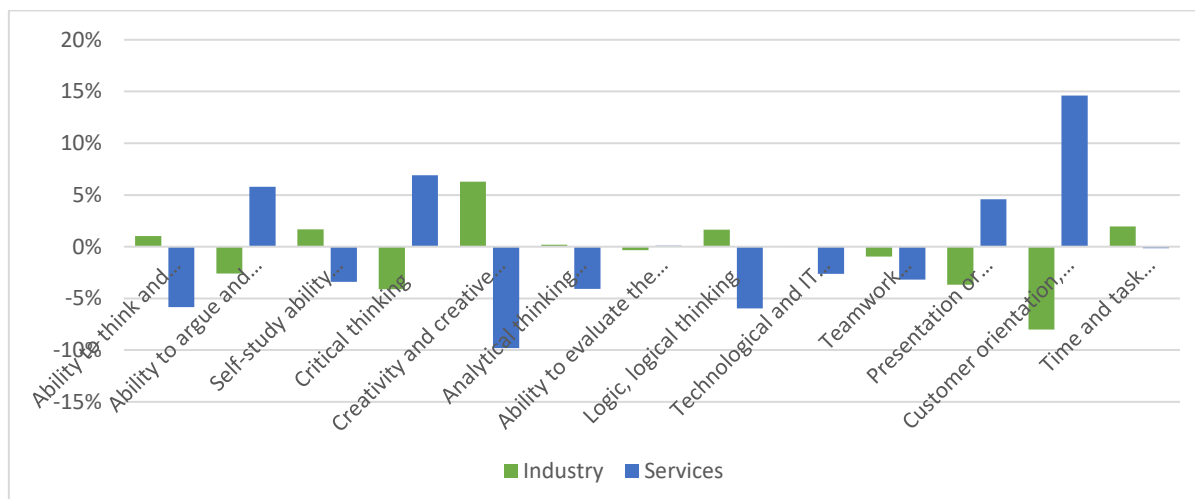
Figure 2: Comparison of industry and services in differences from average assessment of key skills

When analyzing the statistical significance of differences found between industry and services, the significant difference occurred only in two skills (Table 1). Most statistically significant difference was found in customer orientation, ability to understand customer, which is more important for services, while the difference between services and industry being 22 per cent, significant at $p<0.01$ level. Second significant difference was found in creativity and creative thinking which was selected as key skill for 33 per cent of companies in industry compared to 17 per cent of companies in services, significant at $p<0.05$ level. Another differences were not found to be statistically significant.

Table 1: Chi square test results in comparison of industry and services on key skills of candidates

	industry - services
	Chi square χ^2 (p value)
Ability to think and learn	0.8 (0.371)
Ability to argue and persuade (assertiveness in communication)	2.14 (0.144)
Self-study ability (search and process information)	0.61 (0.435)
Critical thinking	3.67 (0.055)
Creativity and creative thinking	4.98 (0.026)*
Analytical thinking (capture, structure and understand information)	0.28 (0.597)

	industry - services
	Chi square χ^2 (p value)
Ability to evaluate the situation (based on the synthesis of multiple factors)	0.01 (0.92)
Logic, logical thinking	1.05 (0.306)
Technological and IT skills, working with specific software	0.26 (0.609)
Teamwork (cooperativity)	0.08 (0.777)
Presentation or communication skills	1.89 (0.169)
Customer orientation, ability to understand customer (empathy, attention, context perception)	11.18 (0.000)**
Time and task management	0.09 (0.764)

*significant at p>0.05, **significant at p>0.01

that are planning to employ a candidate for more than 3 years seem to perceived creativity and creative thinking, ability to evaluate the situation and teamwork as key in candidate more often than companies that plan to employ for less than 1 year. These selected the skill of ability to argue and persuade and time and task management more often than those who plan to employ for more than 3 years. However none of these observed differences were found to be statistically significant. The comparison of answers is presented in Figure 3.
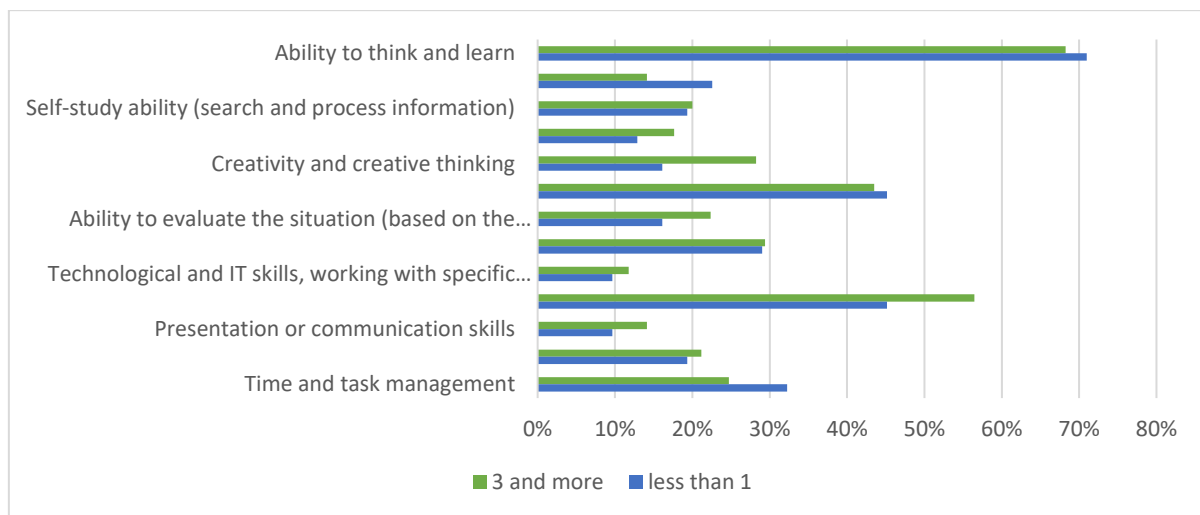
Figure 3: Percentage comparison of companies which plan to employ for less than 1 year and companies that plan to employ for more than 3 years in perceived key skills of candidates

For the control of results we have also looked at the differences based on company size and company maturity (Figure 4). Comparing large companies and SMEs, we can observe that large companies see the analythical thinking and team work more often as key in candidates than SMEs. SMEs on the other hand value more ability to evaluate the situation or logical thinking. Non of the differences are however statistically significant. Similarly while starting and growing companies see ability to think and learn and time and task management more often as key in candidates than mature organizations, no differences were found to be statistically significant.

While based on company size, company maturity or the length of employment were found no statistical differences, we further looked at dependences among perceived the thirteen skills as key in candidates. The following correlation matrix presented in Table 2 shows the correlation results, finding several positive relations. Looking at ability to think and learn we have observed statistically significant relation to logic, logical thinking and teamwork, with low correlation. All of these are in top 4 key skills of candidates that HR managers are looking for. Looking at hard skills of technological and IT skills, positive correlation was found with creativity and creative thinking, analytical thinking, logic, logical thinking and customer orientation. Interestingly, self-study ability was found to correlate only with time and task management, and critical thinking only with ability to argue and persuade.
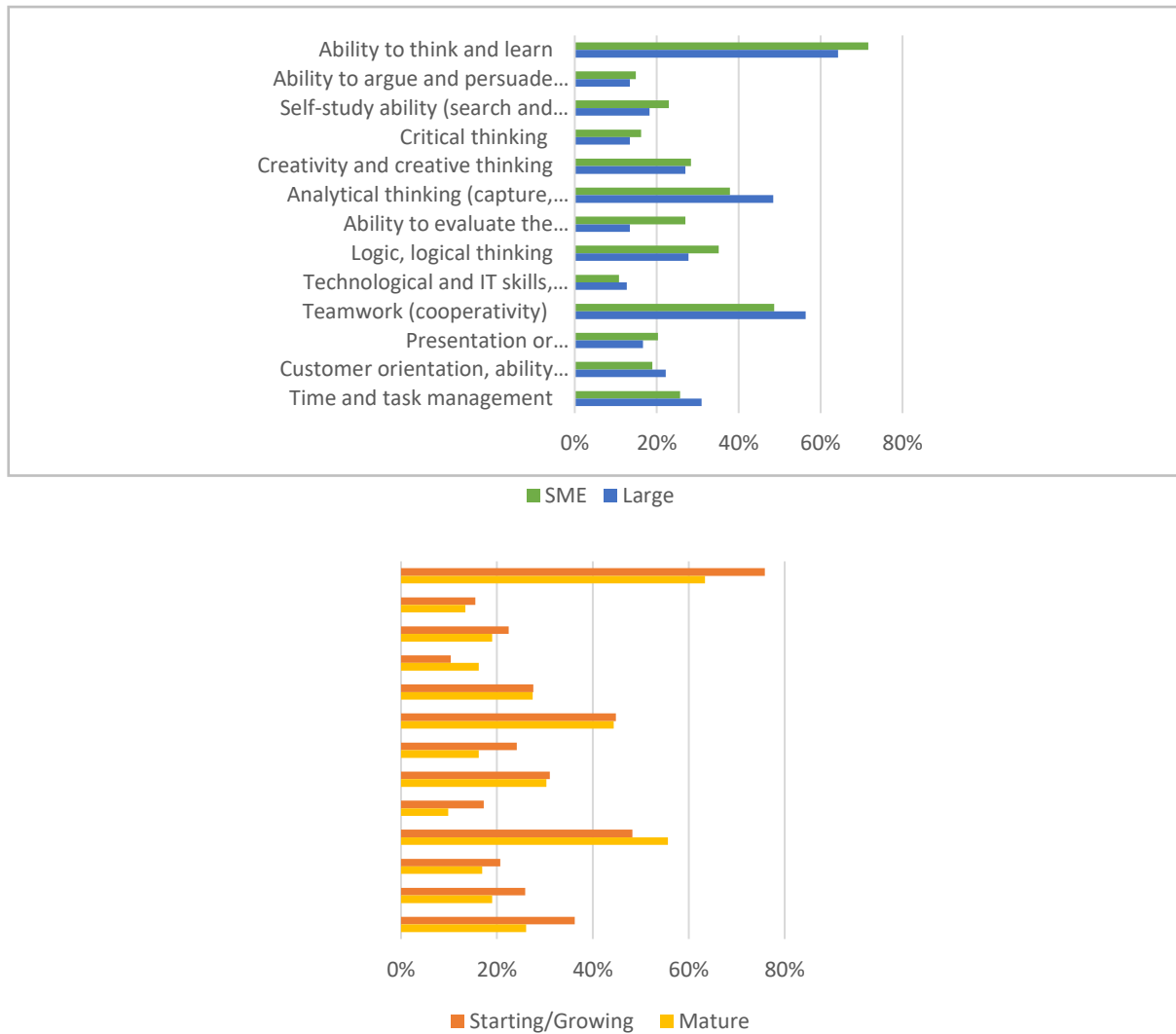
Figure 4: Percentage comparison of SME and large companies and Starting/Growing and Mature companies in perceived key skills of candidates

Table 2: Correlation matrix among perceived key skills of candidates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Ability to think and learn	1											
(2) Ability to argue and persuade	-0,11	1										
(3) Self-study ability	0,08	0,06	1									
(4) Critical thinking	0,01	0,14*	-0,02	1								
(5) Creativity and creative thinking	0,03	0,11*	0,03	-0,03	1							
(6) Analytical thinking	-0,01	-0,04	0,05	-0,16	-0,07	1						
(7) Ability to evaluate the situation	0,05	-0,03	0,05	0	-0,09	0,19*	1					
(8) Logic, logical thinking	0,15*	-0,08	-0,02	0,07	0,07	0,06	-0,15	1				
(9) Technological and IT skills,	-0,01	-0,01	0,04	-0,03	0,1*	0,15*	-0,05	0,1*	1			
(10) Teamwork	0,13*	-0,09	-0,1	0,01	0,03	0,01	0,11*	-0,01	-0,11	1		
(11) Presentation or communication skills	-0,15	0,03	-0,01	-0,05	0,18*	0,06	0,13*	0,04	0,06	0,12*	1	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(12) Customer orientation,	0	0,02	0,06	-0,17	-0,06	0,16*	0,25*	-0,15	0,15*	0,13*	0,15*	1
(13) Time and task management	-0,09	0,08	0,14*	-0,07	0,09	0,08	0,17*	-0,17	0,04	0,07	0,16*	0,1*

* positive correlation significant at $p<0.01$

5. Discussion and conclusion

It its indisputable that ability to think and learn is the most important skill in candidates perceived by majority of companies. Especially in times of disruptive changes which occur in a fast pace, the ability of employees to gather and obtain new knowledge is essential for long term sustainability of businesses. The importance of learning is highlighted by expectation of new skills and new knowledge for future jobs, regarding digital knowledge and new agenda driven by change in work positions. Results of our study show positive findings, that companies regardless the sector, size or maturity consider this skill as most important, with more than 60 per cent of companies. In general the trend for future HR practices in recruitment is built on the premise that companies need to acquire employees especially with skills that are hard to develop. This creates a more competitive environment for recruiters, while many countries in Europe are at their lowest levels of unemployment and thus the competition for employees with desired skills has toughened. Furthermore SHRM Survey pointed out, that many employers and HR managers have a problem assessing skills such integrity, reliability, initiative, customer orientation or teamwork due to the lack of information about the candidates (SHRM, 2016). The survey further shows that while creativity and critical thinking is considered as most important for entry-level positions by less than 10 per cent of employers, its importance dramatically increases by more than 40 per cent over next three to five years. The importance of creativity as a key skill of employees is also in line with results of PWC survey (2016), where 98 per cent of CEO perceive creativity as desired skill, while 67 per cent think it is hard to find in candidates. Report by World Economic Forum (2016) compares important skills of 2015 and expected 2020, where creativity and critical thinking and problem solving are in top 3 skills for 2020. In 2015 creativity was on the 10th place. Results of our study show, that the importance of creativity skill in candidates is 16 per cent greater for industry compared to services. The current changes in business environments in context of Industry 4.0, such digitalization, automatization, IoT or AI are most often presented or understood in the links with manufacturing and industry. However trends show that the employment share from total employment is increasing in service sectors and it is decreasing in industry sectors (World Bank Data). Service sectors are on the rise, and businesses will need to transform their core activities or transform the whole business models. In order to do so, they have to possess talented employees who are able to think out of the box. While the adaption to Industry 4.0 changes is more observable in industry especially for developing countries, the businesses in service sector will need to adapt soon as well, otherwise the risk losing their competitive advantage.

Another interesting finding of our study points to the fact, that there is no statistical significance between perceived importance of skills of candidates by companies who plan to employ for less than a year and for more than three years. From the research sample more than 30 per cent plan to hire for a year or less and almost 50 per cent plan to hire for more than three years. The high percentage of planed short term employments may be explained by the results of Eurofound survey (2015) which show that the lowest job tenure is in the age group of 15-24, even in group of 25-34 for countries like Denmark, Finland, Sweden or Spain. The statistics of Eurostat further show, that the job tenure of young people aged 15-34 has generally decreased in most countries comparing years 2009 and 2016. Another reason comes regarding the type of employment. According to Eurostat and OECD statistics, some countries such Slovakia have increased the percentage of temporary-employment from the total amount of dependent employment over last 15 years. On the other hand European countries like Spain, Portugal, Netherlands or Croatia have more than 20 per cent of temporary employment (OECD, 2017). Thus our observation is interesting for all the countries, while the results show that there is no significant difference in the skills desired by employers. Especially in the case of Slovakia, many temporary jobs being created by demanded by projects, while the time for which the job position exists is constrained by the project itself. These examples may be observable in automotive industry, which is currently largely influenced by many development projects focused on automation and robotization.

Considering the hard skills, which have been the most important skills couple decades ago, it is clear that businesses understand that these skills are trainable. The pressure on education systems has been slowly pushed towards soft skills, while the necessary knowledge has not been neglected either. The key understanding of the

reason why hard skills are not perceived as most important in candidates is that the rapid change in knowledge and technology causes, that hard skills will need to be reviewed and renewed in very short cycles. Thus for businesses the importance lies in the abilities of employees to learn, not in exact hard skills. Further the businesses need to distinguish in which activities is the demand for hard skills. The results show a correlation with analytical thinking, which is an important skill especially for data related work. From the perceptive of customer orientation, where was also found correlation, the hard skills expected are usually linked to operating software products. Many CEOs however agree, that the costs of recruiting new employees are higher than retraining. In this case retraining is very suitable for inadequate hard skills.

To summarize, the main findings of our study are:

- Ability to think and learn has become the most desired skill, regardless company size, maturity or sector.

- Creativity as skill is considered as important skill more for industry than service sectors.

- The importance of specific skills in job candidates does not differ for long-term and short-term employment.

- Job tenure is decreasing, while 30 per cent of employers in our study plan to hire for a year or less.

- Increased need for renewing hard skills in short cycles will cause change in training programs.

- Teamwork and analytical thinking are becoming very important with the increase of service oriented activities of businesses.

Our results show several important findings on the current attitude of employers towards desired employee skills. The disruptive changes leading to transformation of businesses will need to effect the perception of key skills of employees, especially regarding untrainable ones. While industry has not largely focused on service oriented business activities yet, the trends however show that all businesses will eventually need to diversify their activities in order to secure the customer loyalty with complementary services which may or may not be directly linked to the industrial activities. While customer orientation has been found significantly more important skill for services, businesses in industry must focus on these skills regarding future orientation of business activities. Similarly for service sectors, radical changes are expected as well. These changes are always driven by innovation, for which creativity skills are essential. Thus in order to stay competitive, companies from both industry and services need to recruit employees with skills for future, meaning the skills of employees that will be extremely important when businesses go over the inevitable transformations. Considering the competition on the labor market, companies that will lack key skills for new business activities and new transformed business models may lose their competitiveness and hinder their business growth.

Acknowledgements

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The Role of Needs in Creating Shared Value: A Microfoundation Analysis

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Abstract: The concept of Creating Shared Value (CSV) (Porter & Kramer, 2011) received considerable attention from scholars and practitioners alike. It fuels an alternative view of corporate social responsibility (CSR) and sparks the discussion on how organizations can simultaneously create economic and social value. However, the concept has been criticised for lacking a sound theoretical basis and genuine contribution to CSR research. Targeting these shortcomings, Dembek, Singh, & Bhakoo (2016) propose to adopt a need perspective to further ground the concept theoretically and make it seizable in practice. Theorizing on needs has a long-standing tradition in different fields of research. As a consequence, several notion on needs have been proposed. Apparently, Porter and Kramer (2006, 2011) refer to needs as moral imperatives and market opportunities. However, they disregard the motivational aspect of the concept originating from psychological research. This paper draws on the psychological notion of needs as a basic building block of motivation. It conducts a microfoundation analysis on CSV and its relation to needs as a motivational source. This complements the need perspective on CSV and strengthens its theoretical foundations.

Keywords: creating shared value, microfoundations, needs, corporate social responsibility, capacity to act

1. Introduction

Over the last decades, Michael E. Porter has lastingly influenced the prevailing view of corporate strategy and competition among businesses and nations (Stonehouse & Snowdon, 2007). His books have become standard references for management scholars and practitioners alike (Argyres & McGahan, 2002).

With their paper on "Strategy and Society" (2006), Porter and Kramer started to broach the negative effects that the current capitalistic model has on society, environment, and economy. According to the authors, companies adopt a too narrow view on what value is, and solely focus on short-term financial revenues. As a result, the level of legitimacy of businesses "has fallen to levels not seen in recent history" (Porter & Kramer, 2011, p. 4). In order to restore the diminished trust in businesses and enable sustainable innovation and growth, Porter and Kramer (2006, 2011) call for reconsidering the notion of value and propose the concept of Creating Creating Shared Value (CSV). Basically, it claims that creating value should equally leverage economically and socially desired outcomes (Porter & Kramer, 2006). CSV gained much attention from scholars and practitioners (Strand, Freeman, & Hockerts, 2015) and fuelled the debate on how to reinvent capitalism. However, a recent literature review of the concept indicates that CSV "appears to be currently more of a buzzword than a theoretical concept" (Dembek et al., 2016, p. 232). The authors criticize CSV for being unoriginal, naive, and lacking a solid conception of the corporation's role in society (Dembek et al., 2016).

In order to respond to the criticism, Dembek et al. (2016) call for defining CSV more clearly and, thereby, make it more seizable and delimitable from other concepts related to corporate social responsibility (CSR). To this end, the authors propose a need perspective that allows for better specifying CSV by answering: (1) What needs are addressed, (2) how they are addressed, and (3) if they are satisfied.

This conceptual paper seizes on Porter and Kramer's argument (2006, 2011) that organizations become most effective, if they target outcomes that are both economically and socially reasonable. This paper intends to further Demek et al.'s (2016) call for a need perspective on CSV by presenting yet disregarded perspective on needs and their relation to CSV. In particular, the paper reflects on the motivational role of needs and thereby extends the normative and market-oriented view of needs adopted by Porter and Kramer (2006, 2011). The paper answers the research question: How does the motivational notion of needs further the need perspective on Creating Shared Value?

By means of a microfoundation analysis, the paper illuminates the role of needs as a source of motivation and considers its effects on an organizational level. It argues why aligning needs increases shared value for the

organization's stakeholders. Moreover, the analysis promotes the idea that an organization is as a vehicle for effectively and efficiently satisfying stakeholder needs and, thus, yielding shared value.

2. Theoretical background

2.1 Creating Shared Value

Milton Friedman famously claimed that the only social responsibility of business in a free market is to increase its profits, reflecting the core logic of shareholder theory (Friedman, 2002). This stands in stark contrast to stakeholder theory that normatively imposes the obligation to balance the legitimate interests of stakeholders towards businesses, which may be at the expense of their profitability (Mitchell, Agle, & Wood, 1997; Parmar et al., 2010). In other words, stakeholder theory views stakeholders' interests (non-shareholders) as an end in itself that the organization ought to serve, while shareholder theory limits its focus to shareholders and views stakeholders as 'means' to the end of profitability (H. J. Smith, 2003).

Porter and Kramer (2006, 2011) diagnose that maximize profitability has undermined the legitimacy of the current capitalistic model that primarily adopts the logic of shareholder theory. According to them, this is due to a too narrow view of value creation that neglects influencing factors on long-term success, such as customer needs, impact on communities and natural sources, or the viability of key suppliers. They argue that "the purpose of the corporation must be redefines as creating shared value, not just profit per se" (Porter & Kramer, 2011, p. 4). To this end, the authors present the concept of Creating Shared Value. It synthesises the two opposing theoretical perspectives of shareholder theory and stakeholder theory by putting societal needs and challenges at the core of a new business model that, as a result, generates economic value.

CSV is an advancement of corporate social responsibility (CSR) which holds that being sensitive to stakeholders is not philanthropy, i.e. additional costs that reduce the profitability of the company, but rather a source for innovation and growth by "serv[ing] new needs, gain[ing] efficiency, creat[ing] differentiation, and expand[ing] markets" (Porter & Kramer, 2011, p. 7). High-performance companies are those that increase the wealth of the society *and* earn profits *by* meeting the needs of society. In the long run, a prosperous society secures the wealth of a company by safeguarding its strategic resources, e.g. well-educated employees, and the market demand, e.g. customers (Porter & Kramer, 2006). This reciprocal link is not philanthropic, but an approach to strategic corporate social responsibility that complies with competitive mechanisms: Successful companies create a distinctive value proposition that meets the needs of a given set of stakeholders. As a result, the better the company addresses these needs, the more value it generates in a lasting way. From an institutional perspective, CSV sparks a debate on the relation between business and society and how corporate social responsibility can be advanced (Dembek et al., 2016; Mehera, 2017; Strand et al., 2015; Voltan, Hervieux, & Mills, 2017). According to CSV, the collapse of economic and social interests calls the segregation (and, thus, the tension) between society and business into question.

In their literature review of CSV, Dembek, Singh, & Bhakoo (2016, p. 232) conclude that "shared value appears to be currently more of a buzzword than a theoretical concept". This is in line with Crane, Palazzo, Spence, & Matten's (2014) critique that CSV is unoriginal and does hardly advance recent CSR theories. It should be rather seen "a nice new label and a re-brand" (Crane, Palazzo, Spence, & Matten, 2014, p. 51f). Dembek et al. (2016) emphasize three areas to further substantiate and measure the concept of CSV: (1) The means through which it is created, (2) its outcomes, and (3) the beneficiaries of the outcomes. In terms of CSV's outcomes and beneficiaries, the authors suggest to adopt a need perspective. Such a perspective is compatible with Porter and Kramer's (2011) concern of meeting social and economic needs of the society. Moreover, needs are antecedences of value. Based on the analysed cases of CSV in the literature, Dembek et al. (2016) conclude that needs are fundamental to well-being (social perspective) and directing organizational behaviour (organizational perspective). Needs provide a focus for enacting CSV. It allows for pinpointing CSV in terms of what needs are targeted, how they are addressed, and how to measure their satisfaction (Dembek et al., 2016).

2.2 Needs

While Porter and Kramer emphasize the role of needs as the target of CSV, they do not provide a definition of needs in their two seminal papers on the topic (2006, 2011). However, analysing these texts reveals that the authors use the noun 'need' with three different points of reference: (1) The human condition (e.g. need for

nutrition, need for education), (2) groups of people (e.g. stakeholders, society), or (3) institutions (e.g. countries, markets). The authors refer to the object-like quality of needs, as they represent objectives of organizational outcomes (e.g. "Meeting needs in underserved markets often requires redesigned products or different distribution methods" (Porter & Kramer, 2011, p. 8)). For example, when the authors refer to societal needs (16 of 42 occurrences of the term in both articles) they imply a legitimate demand for goods and services of a loose group of people. This macro perspective adopts the market logic of supply (goods and services, satisfiers) and demand (needs).

Reviewing the literature on human needs reveals that needs have different conceptual roots and are differently described by various disciplines. Needs are not only considered to be 'pulling' (such as objectives) as we may interpret the perspective Porter and Kramer (2006, 2011) adopted, but may also refer to 'pushing' forces, i.e. motivation (Dweck, 2017).

Gasper (2005) conducted a meta-analysis on the notion of needs across disciplinary contexts and we may derive at least three different perspectives from it: (1) Needs are instrumental requirements for fulfilling a specific end, (2) needs are claims that enjoy normative priority over other claims, and (3) needs are regarded as positive, i.e. given, motivational factors that drive behaviour.

An instrumental notion of needs is commonly adopted by fields such as innovation and product design (Ericson & Stahlbrost, 2006; Gkouskos, Normark, & Lundgren, 2014) or consumer research and marketing (Bayus, 2008; Pincus, 2004). In these cases, needs are instrumental requisites for meeting a given goals. Needs are distinct from satisfiers. While the first are seen as the trigger for the value creation process, the latter are the outcome of the this process (Patnaik, 2004). In other words, a needs does not prescribe the way in which it may be met (satisfier). As consequence, companies distinguish themselves from competitors in terms of the produced satisfiers (e.g. products or services), and competitive advantage can be gained through the unique nature of these satisfier and/or the relatively better match of needs and satisfiers (i.e. level of need satisfaction) (Von Hippel & Von Krogh, 2016).

Needs as normative imperatives are discussed in social politics and economics. Here, needs are used as a normative principle for policy making. Needs can be used as a rational for the fair allocation of scarce resources (Hamilton, 2006). Needs are used as an evaluation framework for economic development (Max-Neef, 2010). Needs reflect necessities towards an end, and may be prioritized by a moral evaluation of their ends. Candidates of non-contingent (existential) ends include health and autonomy (Braybrooke, 1987), flourishing (Alkire, 2002), and avoidance of harm (Wiggins & Dermen, 1987). In these cases, needs are fundamental essentials of inevitable ends (Frankfurt, 1984).

Drawing on psychological research, needs are a motivational construct that is attached to the individual (micro level). Needs refer to an internal tension that influences the cognitive processes that translate into (need satisfying) behaviour (Baumeister & Leary, 1995; Kanfer, 1990). Consequently, they are the building block of motivation. In her unified theory of motivation, personality, and development, Dweck (2017, p. 697) clarifies the relation between needs and goals in respect to motivation: "If motivation is defined as the forces that drive and direct behavior, then needs serve the energizing (drive) function, whereas goals and goal processes then serve the directive function, guiding the individual step by step toward need fulfillment." When pursuing these need-fulfilling goals, individuals develop mental representations that consist of beliefs, emotions, and action tendencies which influence future goal setting and translate into personality traits (Dweck, 2017). Physiologists have come up with different theories that propose enumerated sets of basic needs (e.g. Alderfer, 1969; Deci & Ryan, 2000; McClelland, 1987; Murray, 1938; Reiss, 2004; Sheldon, Elliot, Kim, & Kasser, 2001), which are non-derivative of other needs (Baumeister & Leary, 1995). However, the proposition that these needs are universal and stable over time reaches its "limits when [it] faces with the remarkable variety of cultures and the reality of people as culturally moulded, thinking decision-makers" (Gasper, 1996).

Considering the theoretical background on needs, we can argue that Porter and Kramer's concept of CSV (2011) mainly hinges on the first two notions of need. Putting needs in the strategic centre of value creation aims at meeting the given ends of a target audience (e.g. society, stakeholder, markets). The authors do not talk about 'wants' or 'demand'; their use of the noun 'need' should indicate the relative moral importance of these claims. An example (Porter & Kramer, 2011, p. 7) demonstrates that 'need' is used as an object-like target of value

creation that represents a moral imperative; and, at the same time, leaves room for how the need is met: "Food companies that traditionally concentrated on taste and quantity to drive more and more consumption are [now] refocusing on the fundamental need for better nutrition."

It becomes clear that a micro level analysis on needs as the individual motivation and its relation to the organizational level of CSV is lacking. Contributing to Dembek et al. (2016) call for a need perspective on CSV, this paper adopts a motivational notion of needs. By means of a microfoundation analysis, the paper reflects on the role of the individual's motivation to achieving organizational outcomes that yields CSV. Thereby, the paper outlines a third way of theorizing the relation between value creation, i.e. CSV, and needs – namely, shared needs as the organizational motivation to generate CSV.

3. Microfoundation analysis

Research on corporate social responsibility is dominated by an institutional level perspective (Lee, 2008). Several authors argue for complementing this by a micro level perspective that illuminates the roots and mechanisms of CSR (Aguinis, Boyd, Pierce, & Short, 2011; Gond, El Akremi, Swaen, & Babu, 2017; Powell & Colyvas, 2008; Wood, 2010). To this end, investigating the microfoundations seems to be promising (Aguinis & Glavas, 2012; Maak, Pless, & Voegtlin, 2016; Molina-Azorín, 2014; Tate & Bals, 2018). A microfoundation analysis helps to explain macro level outcomes in terms of the underlying micro level phenomena and mechanisms (Barney & Felin, 2013; Foss, 2016). Microfoundation research gained momentum in organization and management science and explores the causes and mechanisms on the micro level to explain organization-level phenomena (Molina-Azorín, 2014). It has been applied to various organizational domains (for an overview see Barney & Felin, 2013; Foss, 2010) and proved to be viable for theory building (Felin, Foss, Heimeriks, & Madsen, 2012). In this respect, microfoundation reserach is well compatible with a psychological research agenda on needs. In our case, conducting a microfoundation analysis helps to conceptually explain CSV (macro level outcome) in terms of the underlying motivation of the stakeholders (micro level phenomena and entities). This enables us to bridge the divide between individual motivation (needs) and organizational performance, and adds an explanatory layer to the need perspective on CSV (Dembek et al., 2016).

From a micro perspective, individual motivation is key to explain organizational outcomes (Felin, Foss, & Ployhart, 2015). Following this line of argument, needs and individual motivation steer the creation of shared value. In more detail, drawing from an analytical analysis of the concept of needs (Frankfurt, 1984), needs are instrumental towards a purpose (or end). In the case of psychology, candidates for final purposes include psychological growth, integrity, and well-being (Deci & Ryan, 2000) or, more generally speaking, eudaimonic and hedonic well-being (Ryan & Deci, 2001). In an existential way, Frankl (1966, p. 102) sees the purpose ("meaning") as being outside of our sphere of influence when he prompts that "being human is directed to something other than itself." As a consequence, a purpose in a conditio sine qua none. However, taking the criticism on the proposition of universality of needs serious, does not allow to linearly and reductionistically derive needs from purpose. Apart from most basic human needs, needs are subject to the individual's context and may differ among them (micro level) (Pincus, 2004). Thus, the inference of needs hinges on the circumstances and can be partly seen as a social construction (Buttle, 1989). As outlined earlier, needs cause us to act; in order to balance our unmet needs, we induce need satisfying behaviour. Organizations are a means to align these need satisfying behaviour of individuals and jointly produce value, in at least two ways: gainful employment as a means to satisfy needs ('supply side' from an organization's point of view) or consumption of products and services ('demand side' from an organization's point of view). However, adopting a more radical perspective on the organization as the locus of need satisfying behaviour of stakeholders, then it seems hard to maintain the divide between 'supply' and 'demand' as it becomes pointless.

In order to enhance the analysis and illustrate the link between a psychological stance on needs and the concept of CSV, this paper utilizes Coleman's well-known schema (Coleman, 1990). The so-called "Coleman Bathtub" (or "Coleman Boat") is an useful analytical tool to illustrate how macro and micro levels interact. The diagram emphasizes the role of the micro level that remains usually less considered as it is 'beneath the waterline'. Its graphical representation (see figure 1) depicts the propositional relation (arrow 1) between the macro condition (box [A]) and the micro conditions of the individual (box [B]) which subsequently fuel his/her acting (arrow 2). These actions (box [C]) lead to (arrow 3) macro outcomes (box [D]). Arrow 4 represents the regularity between macro conditions and macro outcomes (Raub, Buskens, & van Assen, 2011).
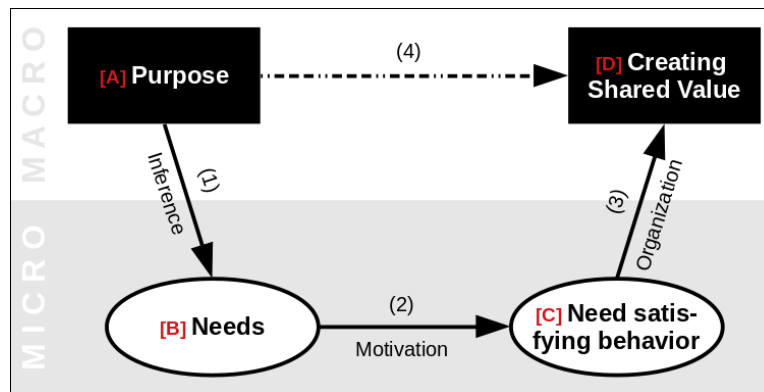
Figure 1: The causal relations of needs (motivation) and Creating Shared Value

The microfoundation analysis illustrated in the Coleman diagram (figure 1) enhances the need perspective on CSV and help us to understand how value is creating in three respects.

- Referring to arrow 1 (in figure 1), a common purpose that is foundational to the nature of men (Chitty, 1993) and, thus, is non-contingent (e.g. survival, flourishing) or a mutual purpose that may be taken for granted (e.g. making profits) or negotiated (e.g. help people achieve their dreams) causes individual needs. These purposes may be abstract, general, and only indirectly relate to the individual, as in the examples of porter (e.g. "wealth of society"…..). However, from a psychological perspective, needs that are derived from these purposes represent a tension between two states (non-satisfaction and satisfaction) and, thus, are a force for action.

- Referring to arrows 2 and 3, needs represent the motivation why individuals organize and create value collectively. They set individuals into motion and direct our goals (Dweck, 2017). From the perspective of the organization's 'input side', some overlap in individual motivations causes stakeholders (e.g. employees) to work together and create relevant organizational outcomes. The argument hold also true for the 'market demand' an organization faces. Stakeholders (e.g. customers) consuming the organization outcome do so, because they thereby satisfy their needs and, mediately, serve their purposes.

Folding these two perspectives, could explain why organizations exists; they are vehicles to bundle individual need-satisfying behaviour.

- Referring to arrow 4, the match between a purpose that is common in society, irrespectively of its moral evaluation, and the organizational outcomes is foundational to what represents value. Referring to the 'output side' of organizations, only if the organization's output meets a purpose, it represents value.

To sum up, if we share the view of Felin and Foss (2005, p. 441) that "organizations are made up of individuals, and there is no organization without individuals and agree with the proposition that needs are inseparable from humans (Chitty, 1993), then needs of individuals are nested in organizations (Korhonen, 2013). We may further argue that organizations are vehicles to bundle needs and effectively and efficiently meet them, and, thus, create shared value and fuel long-term and mutually beneficial relationships among stakeholders (Parmar et al., 2010; Tencati & Zsolnai, 2009)

4. Conclusion

In their Creating Shared Value concept, Porter and Kramer (2006, 2011) apparently adopt the concept of needs as a moral obligation and a market opportunity. This paper set out to complement their view. It advanced the need perspective on CSV (Dembek et al., 2016) and provides further theorizing on the concept. Drawing on psychological research, the paper provided a microfoundation analysis on the notion of needs as underlying motivation for yielding CSV. By illuminating the micro-macro relations between needs, i.e. individual motivation, and CSV, we can conceptually demonstrate what is foundational to CSV and how it comes about. Considering and addressing the relevant factors, i.e. knowing stakeholder needs and providing viable means of need satisfaction, provide the organization with competitive advantage and results in shared value.

This paper intends to spark a discussion on shared motivation among stakeholders and how to align it. It encourages researchers to look differently at the relation of individuals, the organization, and the society with respect to value creation. In particular, it shall trigger further research on whether a motivation argument, i.e.

need perspective, is able to challenge the boundary traditionally drawn between society and organizations that implies a divide of purpose, goals, and motivation. Further work may elaborate on deconstructing this divide and think of organizations as a means for need satisfaction; not treating stakeholders as an exogenous influence, but incorporating stakeholder needs in the organization's strategy. What would this imply?

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The Relationship Among Developmental Leadership, Employee Effectiveness, and Knowledge Creation

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Abstract: Despite the fact that the source of organizational knowledge creation is an individual member in an organization, many studies on knowledge creation have been discussed at the organizational level. Research on knowledge creation at the individual level has been approached mainly from the perspective of the institutional practice related to human resources or organizational mechanisms, and has not studied knowledge creation in terms of the leadership of the middle manager and various employee's organizational behavior. This study empirically analyzed the relationship between developmental leadership, employee effectiveness (job satisfaction, need for achievement, quality of relationship with coworkers) and knowledge creation at the individual level through the structural equation model. As a result of the analysis, although there was a correlation between developmental leadership and individual knowledge creation, the level of knowledge creation was high when employee effectiveness was mediated between two variables. This result suggests that the organization needs to consider attitudinal, motivational, and relational aspects of the employee and provide training in developmental leadership for middle managers in order to promote individual employees' knowledge creation.

1. Introduction

Knowledge creation from individuals in an organization forms the basis of organizational knowledge creation (Wu, 2016; Lam, 2000; Liu, 2012; Nonaka, 1991). Research on knowledge creation has been mainly conducted in terms of top management leadership or support, strategy, organizational structure, human resource management, organizational culture, and information systems at the organizational level (Chan and Chau, 2005, Song, 2008; Youndt and Snell, 2004; Swart and Kinnie, 2013). However, it is difficult to create knowledge at the organizational level without individual knowledge creation (Su, Peng, and Xie, 2016; Oldham and Cummings, 1996; Nonaka and Takeuchi, 1995). As antecedents of individual knowledge creation, Liu (2012) presented incentives such as profit-sharing and group incentives, Wu (2016) studied cognition, situational immersion, and knowledge essence of individual members, and user involvement, cognition of knowledge, and organizational mechanisms are presented by Chou and Tsai (2004).

Although knowledge creation theory has emphasized the middle-up-down leadership of the middle manager (Nonaka and Takeuchi, 1995), it is difficult to find any research on leadership promoting knowledge creation of the employee at the individual level (von Krogh, Nonaka and Rechsteiner, 2012). Only Rai and Prakash (2012) studied the positive relationship between a middle manager's servant leadership and the individual knowledge creation of followers in terms of a relational perspective. Most studies on leadership related to knowledge management have studied knowledge creation at an organizational level (Bryant, 2003; Lakshman, 2005; Politis, 2002).

The purpose of this study is to identify the relationship between the developmental leadership of the middle manager and the knowledge creation of a subordinate at the individual level. Developmental leadership is a behavior in which the supervisor coaches his subordinates, suggests appropriate training programs, and encourages them to improve their knowledge and skills on the job and in their career (Zhang and Chen, 2013; Gilley, Shelton, and Gilley, 2011). The link between developmental leadership and individual knowledge creation can be predicted to be significant in that knowledge creation is based on professionalism, learning, and motivation for new things (Jackson, Hitt, and Denisi, 2003).

The second purpose of this study is to establish employee effectiveness as a mediating variable and to test its role in the relationship between developmental leadership and knowledge creation. The variables are job satisfaction, the need for achievement, and the quality of the relationship with coworkers and these are derived from the attitudinal, motivational, and relational dimension. Thus, this study identifies that developmental

leadership will lead to individual knowledge creation through increasing employee effectiveness. The advantage of this research is that it grasps the antecedents of individual knowledge creation in terms of leadership and employee effectiveness.

2. Theoretical background and hypothesis

2.1 Developmental leadership

Developmental leadership refers to supervisory behaviors aimed at developing subordinates' work-related knowledge and skills and facilitating their personal and vocational development (Zhang and Chen, 2013). Hudson (1999) said that developmental leadership is the process of equipping people with the knowledge, skills, and opportunities they need to grow, develop, change, and become more effective. Wilson (2004) defines developmental leadership as a process in which a supervisor improves subordinates' abilities in such a way by training, coaching, and mentoring.

A leader's developmental behaviors include mentoring, guiding, coaching, counseling, providing feedback, and offering developmental experience (House, 1998; Zhang and Chen, 2013). Gilley, Shelton and Gilley (2011) discussed that developmental leadership allows leaders the opportunity to better serve their employees through a variety of activities such as integrated communications, developmental evaluations, performance growth and developmental activities, and reward and recognition systems used to improve employee's accomplishments and development.

There are two perspectives on developmental leadership. First, a developmental leader facilitates the learning of the subordinate. When employees do not possess the knowledge, skills, or attitudes to appropriately perform their jobs, or when they are unable to properly sequence performance activities and tasks, it is appropriate for developmental leaders to serve in the role of the learning facilitator (Whitemore, 1997). In this role, the developmental leader is the one-on-one tutor with employees and is responsible for sharing information and knowledge that will ultimately affect employees' growth and development (Gilley, Shelton and Gilley, 2011). Yang (2016) also considered developmental leadership as a learning process for supervisors and subordinates, and classified it into direct learning such as coaching and indirect learning such as initiative behavior and participatory decision-making.

Second, researchers regard developmental leadership as an extension of relationship-oriented leadership behavior. They see the concept of developmental leadership as a way of emphasizing the behavior of a leader in the development of followers in relationship-oriented leadership behaviors. For example, Zhang and Chen (2013) described developmental leadership as a way to develop followers' abilities and knowledge, and paid attention to a transformational leadership as a source of developmental leadership. They considered the individualized consideration and intellectual stimulation that constitute transformational leadership to be a kind of developmental leadership. Because developmental leadership is part of a relationship-oriented leadership, developmental leadership has the advantage of establishing a collegial partnership based on two-way communication, trust and honesty (McIntyre, 2010; Gilley, Shelton and Gilley, 2011).

This study discusses two aspects of developmental leadership by applying it to knowledge creation. First is the learning model. This model is a view that developmental leaders encourage and train their subordinates, enabling them to create knowledge because they strive to learn to specialize in their jobs. Second is the relationship model. This model points out that developmental leadership enables subordinates to create higher knowledge because their subordinates are more aware of their social relationship quality with their supervisors, thereby increasing their human resource effectiveness. Variables related to human resource effectiveness are job satisfaction, need for achievement, and quality of relationship with coworkers.

The two views on developmental leadership and knowledge creation are consistent with the two views on knowledge creation (intellectual capital and social capital). In other words, knowledge creation is enabled by intellectual capital by expertise such as education and training and by relational capital through interaction with people. Developmental leadership encompasses two aspects of knowledge creation (the learning model and the relationship model). The following discusses the details of the two models.

2.2 Developmental leadership and knowledge creation

Individual knowledge creation is a creative act that creates new and useful ideas, know-how, procedures and solutions (Oldham and Cummings, 1996). Knowledge creation is the act of converting experiences of a specific problem domain into knowledge (Awad and Ghaziri, 2004). Research on individual knowledge creation are as follows.

Nonaka and Takeuchi (1995) suggested that knowledge is created through the interaction and intersection between tacit and explicit knowledge, following four different modes of conversion, i.e. SECI. Nonaka and Konno (1998) argued that knowledge creation occurs through four Ba (Originating ba, Interacting ba, cyber ba, and exercising ba). Liu (2012) studied R & D Professionals who were engaged in the high-tech industry in Taiwan, and reported that incentives such as organizational profit-sharing and group incentive encourages individual knowledge creation by providing employees' psychological ownership. Wu (2016) regarded knowledge development performance as knowledge creation and presented individual cognition, situational immersion, and knowledge essence as antecedents of individual knowledge creation. Chou and Tsai (2004) conducted a survey of 271 employees in various industries in Taiwan. They examined the relationship between user involvement, cognition of knowledge, and organizational mechanism such as IT steering committees, information technology systems, conferences and trade fairs and knowledge creation.

This study suggests developmental leadership as an antecedent of individual knowledge creation. Discussions on developmental leadership and knowledge creation are as follows. Bass (1985) identified a number of specific developmental behaviors including career counselling, careful observation of staff, recording followers' progress and encouraging followers to attend technical courses. This leadership behavior is related to an individual's knowledge creation, as it encourages a subordinate's intellectual stimulation such as creating knowledge on competence development and job performance. Gilley, Shelton and Gilley (2011) argued that developmental leadership emphasizes evaluation and development activities for performance and capacity development of the subordinate, so that the leader helps the subordinate solve problems which are challenging, creative and innovative. Yoon and Lim (1999) pointed out that developmental leadership leads to a higher perception of organizational support. Employees who are highly aware of organizational support are highly committed to the organization and will create new knowledge as part of their contribution to the organization. Also, leaders can be role models that are subject to the social imitation of the subordinate (Bandura, 1976). Thus, the supervisor's developmental leadership can become a role model for the subordinates, so that subordinates will try to improve their abilities such as creating new knowledge by mimicking the appearance of a developmental leader. For example, the subordinate will train himself and make an effort to share knowledge actively with people around him. As a result, the surbordinate can create new knowledge. Therefore, this study proposes the following hypothesis.

> **Hypothesis 1:** *The supervisor's developmental leadership will have a positive impact on the subordinates' knowledge creation.*

2.3 Developmental leadership, employee effectiveness, and knowledge creation

The mediating variables in relation to the development leadership and the individual knowledge creation are discussed. The variable is the employee effectiveness and its concrete constructs are job satisfaction, need for achievement, and quality of relationship with coworkers. This study considers the variables in terms of attitudinal, motivational, and relational dimension. Discussions on the relationship between developmental leadership, employee effectiveness, and knowledge creation are as follows.

(Job satisfaction) Job satisfaction is a pleasant emotional state or overall positive mood for the job perceived by an individual (Spector, 1997). The antecedents of job satisfaction include the job itself, the quality of the supervisor and the relationship with coworkers, wages, welfare, and company policy (Herzberg, 1968; Linz and Semykina, 2012). Because job satisfaction is a motivating factor for job performance (Linz and Semykina, 2012), satisfied employees will try to create new ideas and knowledge to increase job performance through competency development and knowledge acquisition.

Wofford and Liska (1993) suggested that leadership can increase the perception of the socio-emotional support of employees. Their argument means that developmental leadership can increase the job satisfaction of the subordinates because it can improve the quality of the social relations between supervisor and subordinates.

Also, because the subordinates appreciate the supervisor who teaches expertise and advises on their performance, the subordinates are highly aware of the socio-emotional support and can therefore have a high level of job satisfaction. The leader's emotional support to their subordinate has a positive relation to the job satisfaction of the subordinate (Rafferty and Griffin, 2006). For example, Higgins and Thomas (2001) found in a sample of lawyers that career-oriented assistance and psychological support of the leader were positively correlated with the job satisfaction of the subordinate. The following hypothesis is proposed through discussions on the relationship between developmental leadership and job satisfaction, and job satisfaction and knowledge creation.

> **Hypothesis 2:** *Job satisfaction will mediate the relationship between developmental leadership and knowledge creation.*

(Need for achievement) The need for achievement refers to the degree to which individuals want to achieve success and excellence through the accomplishment of challenging tasks (McClelland, 1987). Individuals having a high need for achievement look for challenges, enjoy excellence in performance, and demonstrate competitive behaviors in work activities (Liu, Liu, and Wu, 2010). It can be assumed that individuals having a high need for achievement will make an effort to acquire various knowledge and create new knowledge as a means of achieving success. Breu and Hemingway (2002) analyzed the relationship between the community of practice and knowledge creation through interviews toward practitioners. As a result, the need for achievement was presented as an antecedent in knowledge creation.

Developmental leadership is associated with the need for achievement by the subordinate. A developmental leader counsels and advises on an employee's job performance or career development, which is the same as a supervisor who motivates the growth of his or her subordinates. Gilley, Shelton and Gilley (2011) argued that developmental leaders identify performance standards, communicate these to employees, compare actual work to desired standards, and discuss results with employees. A developmental leader discusses reasons for the poor performance of subordinates and will identify barriers in the work environment for them and then he or she will guide or support their subordinates to set a goal or plans for improvement (Gilley, Shelton and Gilley, 2011). If a developmental leader advises on his or her subordinates' performance and sets a goal, it can increase their subordinate's motivation for achievement. The hypothesis is set up through the above discussion. The following hypothesis is proposed through discussions on the relationship between the need for achievement and knowledge creation and developmental leadership and the need for achievement.

> **Hypothesis 3:** *The need for achievement will mediate the relationship between developmental leadership and knowledge creation.*

(Quality of relationship with coworkers) The quality of relationships with coworkers refers to the intimacy stemming from trust and confidence among team members. High-quality relationships based on trust and confidence may nourish employees' psychological needs by, for instance, providing positive feedback about one's job competence and through support (Fernet, Gagne, and Austin, 2010). Therefore, if the quality of a peer relationship is good, the knowledge sharing among the group members can be actively performed, and the positive advice from the peer can be received, which is also helpful for creating new knowledge. Fernet, Gagne and Austin (2010) empirically suggested that a high-quality relationship with coworkers is positively correlated with providing information or knowledge about the job competence of peer colleagues. Because an employee can acquire new knowledge from reliable coworkers, it is beneficial for him or her to create more new knowledge.

Also, supervisors' developmental leadership will increase the quality of peer relationships among their subordinates. When a developmental leader advises his subordinates about growth and development, it allows the subordinates to consider the supervisors' leadership as a kind of organizational support (Rhoades and Eisenberger, 2002). Those who are highly aware of organizational support have a positive attitude toward their job and organizational life (Saks, 2006; Settoon, Bennett, and Liden, 1996).

Thus, members will seek to cooperate and create good relationships as part of a kind of expression of appreciation for supervisors and organizations that have provided good organizational support. Gilley and Boughton (1996) also argued that developmental leadership can build good peer relationships based on two-way communication, trust, and honesty in the group. The hypothesis is set up through the above discussion. The following hypothesis is proposed through discussions on the relationship between the quality of relationships with coworkers and knowledge creation, and developmental leadership and the quality of relationship with coworkers.

Hypothesis 4: *The quality of relationships with coworkers will mediate the relationship between developmental leadership and knowledge creation.*

3. Methodology

Developmental leadership was assessed via a 5-point Likert scale and measured with three items adapted from House's (1998) developmental orientation measure and Rafferty and Griffin's (2006) measure. Sample items are "my work unit leader coaches me to improve my on-the-job performance", "my work unit leader suggests training to improve my ability to carry out my job". This scale had a Cronbach α of .85.

The quality of relationships with coworkers was assessed via a 5-point Likert scale and measured with four items adapted from Fernet et al's (2010) scale. Sample items are "the relationship between I and coworkers are harmonious in my team", "I am satisfying the relationship with coworkers in my team". This scale had a Cronbach α of .85.

The need for achievement was assessed via a 5-point Likert scale and measured with three items adapted from Guerrero and Seguin's (2012) and Steers and Braunstein's (1976) scale, which was revised by Yamaguchi (2003). Sample items are "I enjoy setting and achieving meaningful goals", "I enjoy difficult challenges and high responsibilities". This scale had a Cronbach α of .76.

Job satisfaction was assessed via a 5-point Likert scale and measured with two items adapted from Rafferty and Griffin's (2006) scale. Items are "overall I am satisfied with my job", "overall I am satisfied with the many things that I do in the company". This scale had a Cronbach α of .79.

Knowledge creation was assessed via a 5-point Likert scale and measured with three items adapted from Choo, Linderman, and Schroeder's (2007) scale. Sample items are "I generates many ideas while doing the job", "Solutions found in doing my job are clearly unique and innovative". This scale had a Cronbach α of .77.

Control variables are industry sectors (manufacturing and service), gender, age, and tenure. The survey was aimed at employees who were working in S. Korean companies with more than 100 full-time regular workers and conducted from August to September 2018. A total of 235 questionnaires were collected, 220 out of which, those with insincere answers excluded, have been analyzed. Out of the total 220 employees, 114 employees (51.8%) were working in manufacturing and 106 employees (48.2%) were in service sectors. The manufacturing sector includes the construction, electronics, automotive, food, and semiconductor industries, and the service sector includes medical, financial, education, publishing, broadcasting, and tourism industries. 148 employees (67.3%) were working in managerial positions and 72 employees (32.7%) were in technical positions. The average age was 39.4 years and average tenure was 9.5 years. The gender of workers was 153 males (69.5%) and 67 females (30.5%).

4. Results

Reliability analysis was conducted. As mentioned above, all values of Cronbach α were over 0.7. Factor analysis using the principal factor with varimax rotation method was conducted. The Eigenvalue of all factors was over 1 and accounted for 69.0% of the total variance explained.

Means, standard deviations and zero-order correlations among the variables are shown in Table 1. At the correlation analysis, variables of this study almost had a significantly positive correlation with each other (between the $p<0.05$ and $p<0.01$ levels). At the control variables, gender (male) was positively correlated to knowledge creation ($r=.151$, $p<.05$) and other control variables were not significantly correlated to knowledge creation.

To test the hypotheses, structural equation models were constructed and analyzed by the SPSS AMOS 25 version program. The results are shown in Table 2. The first model is for testing H1, which is the relationship between developmental leadership and knowledge creation. The model fit was appropriate ($χ2 = 10.798$, df = 4, CFI = .984, GFI = .981, RMSEA = .088) and the standardized path coefficients were significant ($β = .340$, $p <.001$). As a result, H1 was supported.

The second model is to test H2~H4, which is the relationship between developmental leadership, employee effectiveness (job satisfaction, the need for achievement, quality of relationships with coworkers) and knowledge creation. The results showed that the model fit was statistically a good level (χ^2 = 139.29, d.f = 71, CFI = .95, GFI = .92, RMSEA = .07) and all standardized path coefficients were significant as shown in Table 2. As results, H2, H3, H4 were supported.

Table 1: Correlation analysis results

Variables	Mean (s.d)	1	2	3	4	5	6	7	8	9
1. Developmental leadership	3.1561 (.8898)	1								
2. Job satisfaction	3.3182 (.7531)	.519**	1							
3. Need for achievement	3.7333 (.6351)	.270**	.375**	1						
4. Quality of relationship with coworkers	3.7125 (.6006)	.368**	.405**	.408**	1					
5. Knowledge creation	3.3136 (.7565)	.334**	.379**	.417**	.400**	1				
6. Tenure	9.5409 (.6285)	.111	.215**	-.057	.157*	.033	1			
7. Gender (male=1)	.6955 (.4612)	.061	.004	.012	.074	.151*	.198**	1		
4. Age	39.39 (.9400)	-.014	.133*	-.115	.068	.051	.663**	.296**	1	
9. Industry (Service=1)	.4818 (.5008)	-.009	-.039	.095	.117	.009	.039	-.093	.056	1

**: p<.01, *: p<0.5

The third model consists of a full model including H1-H4 to analyze the mediating effects of employee effectiveness (model 3). The model fit was significantly appropriate (χ^2 = 139.00, d.f = 70, CFI = .94, GFI = .92, RMSEA = .03), however the level of model fit was more or less lower than the second model. The more important result in the third model is that the standardization coefficients of employee effectiveness and knowledge creation were statistically significant, but the standardization coefficients of developmental leadership and knowledge creation were not significant (β = .048, p>.10). This result shows that employee effectiveness (the need for achievement, quality of relationships with coworkers, job satisfaction) is more effective in the relationship between development leadership and knowledge creation than in the direct relationship between development leadership and knowledge creation.

5. Conclusions

This study examined the relationships among middle manager's developmental leadership, employee effectiveness (job satisfaction, the need for achievement, quality of relationships with coworkers), and knowledge creation for employees working for Korean companies which have more than 100 regular employees.

The results of this study are as follows. Developmental leadership that encourages their subordinates to improve their competence and performance, suggests training programs and advises them, helps their subordinates to create innovative and creative solutions. However, the results of the mediating analysis showed that the developmental leadership promotes the knowledge creation of the subordinate through the employee effectiveness rather than the direct influence of the supervisor's developmental leadership on the knowledge creation of the subordinate. In other words, developmental leadership enhances subordinates' job satisfaction, need for achievement, and good relationships with their peers, which in turn activates subordinates' knowledge creation.

Table 2: Paths from structural models

Models	Paths from developmental leadership to outcomes	Standardized path	Standard error	t value	Model fit
Model 1	• Developmental leadership → Knowledge creation	.340	.072	4.716***	$\chi 2 = 10.798$ df = 4 CFI = .984 GFI = .981 RMSEA = .088
Model 2	• Developmental leadership → Job satisfaction	.468	.066	7.065***	$\chi 2 = 139.29$ d.f = 71, CFI = .949 GFI = .915 RMSEA = .066
	• Developmental leadership → Need for achievement	.280	.057	4.927***	
	• Developmental leadership → Quality of relationships	.351	.057	6.202***	
	• Job satisfaction → Knowledge creation	.270	.093	2.912**	
	• Need for achievement → Knowledge creation	.425	.106	4.021***	
	• Quality of relationship → Knowledge creation	.259	.090	2.888**	
Model 3	• Developmental leadership → Knowledge creation	.048	.100	.478	$\chi 2 = 139.00$ d.f = 70 CFI = .94 GFI = .92 RMSEA = .03
	• Developmental leadership → Job satisfaction	.466	.067	6.995***	
	• Developmental leadership → Need for achievement	.279	.057	4.893***	
	• Developmental leadership → Quality of relationships	.350	.057	6.186***	
	• Job satisfaction → Knowledge creation	.232	.119	1.948*	
	• Need for achievement → Knowledge creation	.416	.112	3.720***	
	• Quality of relationship → Knowledge creation	.245	.098	2.495*	

***: p<.001, **: p<.01, *: p<.05

The academic meaning of this result is that two models of developmental leadership and knowledge creation can be derived. The first is the learning model of developmental leadership. This model emphasizes that developmental leadership enables subordinate knowledge creation because it encourages subordinate learning and teaches them. The second is the relational model of developmental leadership. This model stresses that developmental leadership creates a smooth relationship with subordinates, thereby enabling them to create knowledge. The results of the analysis show that the relational model is more effective in creating knowledge of subordinates than the learning model of developmental leadership. In the future, further study of the developmental leadership model will be needed.

The implications of this study are first, this study identified that developmental leadership of middle manager and employee effectiveness are antecedents of individual knowledge creation which was overlooked in previous studies. The results show that in order for an organization to activate the knowledge creation of individual members, the organization should require middle managers to actively coach their subordinates. Coaching helps subordinates create knowledge because the supervisor provides their experience and knowledge to them. Thus leadership training is required for effective coaching for subordinates of middle manager. von Krogh, Nonaka, and Rechsteiner (2012) also stressed that developing leadership skills fosters knowledge creation among employees. Second, this study indicates that developmental leadership is related to organizational innovation through employee knowledge creation. As many studies of organizational knowledge creation have argued (Nonaka and Takeuchi, 1995), creative people constitute the core of innovation (Bergendahl and Magnusson, 2015; Chang, Hung and Lin, 2014). Third, unlike many previous studies that have attempted to identify

antecedents of organizational knowledge creation (Chan and Chau, 2005; Song, 2008; Gagne, 2009; Youndt and Snell, 2004; Swart and Kinnie, 2013), this research studied the leadership of middle managers and knowledge creation at the individual level.

The limitations of the study is that the study did not carry out a pre-validity test before establishing employee effectiveness variables related to knowledge creation. In the future, it is necessary to study closely the employee attitudes and behaviors related to the creation of individual knowledge through interviews with practitioners and a case study. Also, knowledge creation variables in this research are based on subjective measures and self-reported data, which are subject to common method bias. Nevertheless, the results from tests for common method bias indicate that there is no serious cause for concern in this case. To further improve the data quality, future research may adopt objective measures for individual knowledge creation and consider multiple performance indices.

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Is Intellectual Capital Phronesis? An Aristotelean Interpretation

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Abstract: The paper aims to deconstruct the concept of practical wisdom to develop new ideas about the value of the intellectual capitals. The field of Intellectual Capital (IC) risks becoming irrelevant. Recent research recommends focusing on how to use IC theory to manage intangible assets. Knowledge management provides an opportunity to help IC theory make this transition. This paper presents a research agenda for better understanding the practical value of the intellectual capitals. The theoretical lens used is Aristotle's practical rationality or 'phronesis'. In Aristotle's framework, practical wisdom is the highest intellectual virtue. The data, information, knowledge, wisdom (DIKW) hierarchy is often used in knowledge management. The theory of professional practice makes explicit distinctions between technical and practical knowledge. Habermas (1971) distinguished between technical knowledge as formal, explicit, propositional, and discursive; and practical knowledge as tacit and embodied in action. This is similar to Aristotle's distinctions between scientific knowledge (episteme) and craft knowledge (techne). Episteme (Habermas's technical knowledge) consists of deductions from basic principles, and techne (Habermas's practical knowledge) is about how to make things. The third part of Aristotle's framework is Phronesis (social practice wisdom), which is the integration of intellectual and ethical virtues to create deliberative excellence that has positive long-term impacts for humanity. It includes the ethical virtue known as Eudaimonia, which is the capacity to make good choices about the most reasonable way to act. This paper applies these ideas to the intangible assets - intellectual (structural), relational, and human capital – within the context of professional practice. The outcome is new thinking about how the three capitals may be better managed as components of professional standards (episteme), judgements about practice (techne), and acting with moral virtue (phronesis).

Keywords: knowledge, intellectual capitals, wisdom, professional practice, practice wisdom

1. Introduction

This paper contributes to a fifth stage of intellectual capital (IC) research with a new conceptualisation of IC as practical wisdom. The current fourth stage of IC research examines how IC may help organisations provide sustainable value, as well as economic value (Dumay (2013). This has created an opportunity for IC research to help address "the paramount ecological, social, and demographic problems that our societies are facing" (Dameri and Ricciardi, 2015, p. 861). While this is a noble goal, how IC operates within this wider societal ecosystem (Massaro, et al., 2018); and the complex web of cause-and-effect relationships associated with IC value creation, needs further investigation and analysis (Zakery, et al., (2017). This paper provides new insights for the fifth stage of IC research to explore the relationship between IC and sustainability in practice (Massaro, et al., 2018) by discussing how IC fits within the concept of professional practice.

The literature agrees that research and practice produce distinct forms of knowledge (Tsoukas and Cummings, 1997). Professionals progress from novice to master in the course of practising their craft. How this occurs requires deconstructing professional practice. Professional practice is the 'enactment of a group of people in a profession or occupation who serve or contribute to society' (Higgs, 2012: 75). In this sense, professional practice knowledge represents a higher level of knowing than other practical knowledge due to the quality of decisions it enables. The DIKW hierarchy places wisdom above knowledge due to the impact of experience (Ackoff, 1989). While the relationship between knowledge and experience is controversial, researchers have argued that the difference between knowledge and wisdom is experience gathered from accumulated learning and understanding (Faucher et al., 2008). Researchers argue that practical wisdom should be used as an organising framework for professional knowledge (Higgs, 2012: 77). Practical wisdom has an ethical virtue known as Eudaimonia, which is 'the capacity to act based on reasoning with regard to things that are good or bad for humanity' (Thompson, 2017: 212).

Professional practice provides IC research with an opportunity to examine the "collective intelligence" (Secundo, et al., 2016: 300) necessary to make any organisation truly sustainable (Gray, 2006). Researchers argue that IC is part of a firm's value-creating intangible assets but there is limited empirical evidence about how this value is created in practice (Guthrie et al., 2012). Intangible assets are part of a network of causally ambiguous resource relationships that influence a firm's performance (Dierickx and Cool, 1989). Many organisations are becoming aware of the importance of sustainability and 'are taking positive steps to ensure future generations have the

ability to meet their needs' (Dumay, 2016: 169). This paper proposes that the practical wisdom of professional practice is the collective intelligence defining the ability of any organisation to 'carry out tasks or solve problems' associated with sustainability 'more effectively and efficiently than by individuals, through collaboration and knowledge sharing' (Secundo, et al., (2016: 300). This paper continues by exploring how IC might contribute to Eudaimonia at an individual and collective level. Organisations with higher levels of practical wisdom will have better prospects in developing sustainability. Given sustainability is increasingly valued by practitioners, investors, and society; understanding how IC impacts on firm performance by helping identify managerial strategies and subsequent interventions (Dumay, 2009) to increase any organisation's practical wisdom should attract much attention. The paper examines these themes by conceptualising about how the three capitals - human, structural, and relational - may be better managed as components of professional standards (episteme), judgements about practice (techne), and acting with moral virtue (phronesis).

2. Why does this conceptualisation matter?

If people use practical wisdom, they make good decisions with impact internally and externally to the organisation. The outcome is better management of intangible assets linked to improved productivity, morale, and increased performance particularly in terms of complex problem solving. There is a risk that the conceptualisation of IC as practical wisdom adds to an already overcrowded literature. Dumay states that 'one problem with IC is there are many different definitions' (Dumay, 2016: 169). IC needs to move on from measurement models, disclosure, and reporting. This paper does not want to simply add another definition of IC. Dumay suggests that IC research should focus on "what was previously secret or unknown, so that all stakeholders understand how an organisation takes into consideration its ethical, social and environmental impacts" (Dumay, 2016: 169). The disclosure of how IC in practice can create sustainability is something that organisations might have previously considered a source of competitive advantage and, therefore, to be kept secret. However, the growing recognition that corporate social responsibility creates both social and economic value (e.g. through public relations) means disclosure of the causality of sustainability is the competitive advantage itself. This means that how well organisations disclose their practical wisdom may be a source of competitive advantage; requiring them to understand what it is; how to measure its stocks; and management strategies that can increase it.

3. Literature

3.1 Intellectual capital

Intellectual capital is knowledge that can be converted into profit (Sullivan & Sullivan, 2000). Intellectual capital is often interchanged with other terms such as intangible assets, intangible resources, intangible capital, and intellectual property, despite the fact that they are not synonymous (Giacosa, et al., 2017). The most widely used classification is Stewart's (1997) model of human capital (HC), structural capital (StC) (sometimes called organizational capital), and relational capital (RC) (sometimes called customer capital). HC represents the human factor in the organization: the combined intelligence, skills, and expertise that give the organization its distinctive character (Bontis 1998). StC is a 'documented system of rules, operating procedures, or formalized organizational routines' (Hislop, 2011: 23). RC is knowledge gained from relationships outside the organization, e.g. customers, contractors, suppliers (Massingham, 2019). This paper adopts the following definition:

> "[IC] is the sum of everything everybody in a company knows that gives it a competitive edge […] Intellectual Capital is intellectual material, knowledge, experience, intellectual property, information […] that can be put to use to create [value]." (Dumay, 2016: 169)

Practitioners define intellectual capital this way:

> "Human capital (HC): ability, culture, education, employee, human, leader, leading, management, work, working
>
> Structural capital (StC): chain, data, design, governance, models, per cent, practices, process, programme, system, systems, technology
>
> Relational capital (RC): brand, campaign, collaboration, community, consumer, conversation, customer, investor, market, media, partner, relationships, stakeholder, supply, team, trust, (Massaro, et al., 2018: 373)

These words are derived from a research study which used content analysis to identify how practitioners discussed IC concepts on online blogs (Massaro, et al., 2018). The analysis shows that practitioners see HC as

personal knowledge with a focus on competencies; StC as organisational knowledge with a focus on capabilities; and RC as external knowledge with a focus on reputation.

3.2 Professional practice

The theoretical lens used is Aristotle's idea of practical rationality (see Ellett, 2012: 12), which is knowledge that helps with practical matters such as actions associated with professional practice (Tsoukas and Cummings, 1997). Practice knowledge is 'the sum of the knowledge used in practice (including theorisation), and experiential knowledge' (Higgs, 2012: 77). In organization studies, the former is discipline knowledge e.g. university qualifications; while the latter is knowledge gathered from professional practice experience (Higgs, 2012: 77), or what Ellett (2012: 14) calls embodied social practice, and knowledge gained from personal experience (personal knowledge), (Higgs, 2012: 77), or what Ellett (2012: 14) calls deliberative judgement.

The theory of professional practice makes explicit distinctions between technical and practical knowledge (Habermas, 1971). Habermas (1971) distinguished between technical knowledge as formal, explicit, propositional, and discursive; and practical knowledge as tacit and embodied in action. This is similar to Aristotle's distinctions between scientific knowledge (episteme) and craft knowledge (techne). Episteme (Habermas's technical knowledge) consists of deductions from basic principles, and techne (Habermas's practical knowledge) which is about how to make things (see (Tsoukas and Cummings, 1997).

3.3 Practical wisdom

In Aristotle's framework, practical wisdom is the highest intellectual virtue (Tsoukas and Cummings, 1997). Wisdom emerges from a combination of 'pedagogical thinking and reasoning' (Ellett, 2012: 12). Practical wisdom emerges through 'experiences, learning, reflecting, critical dialogue, making theories, and creating and testing hypotheses'. (Higgs, 2012: 75). Research has found that wisdom comes from the practice of doing work itself (Ellett, 2012: 12). For many years, the literature has agreed that research and practice produce distinct forms of knowledge (Tsoukas and Cummings, 1997). The proposed 5th stage of IC research explores the relationship between IC and sustainability in practice (Massaro, et al., 2018). This paper contributes to this new research agenda for IC research by discussing how IC fits within the concept of professional practice. Professionals progress from novice to master in the course of practising their craft. How this occurs requires deconstructing professional practice. This paper does this deconstruction by using Aristotle's idea of practical rationality to explore how the IC capitals might create practical wisdom. The connection with the 5th stage of IC research is practical wisdom's ethical virtue known as Eudaimonia, which is the capacity to make good choices about the most reasonable way to act. Conceptualising IC as practical wisdom may help identify levels of Eudaimonia within any organisation and, therefore, the capacity to achieve sustainability.

3.3.1 Episteme

In organization studies, episteme is professional practice. Practice is 'doing, knowing, being, and becoming' (Higgs, 2012: 75). A professional is distinguished by 'the capacity to make sound judgements in the absence of certainty' (Higgs, 2012: 79). Professional practice is based on 'specific intentions and values (and) is often grounded in assumptions rather than conscious decisions' (Higgs, 2012: 76). These assumptions are 'constructed by individuals and groups' (Higgs, 2012: 76). This construction begins at university with theoretical knowledge (Ellett, 2012) and, therefore, is situated in literature (Higgs, 2012). It is situational (Higgs, 2012), in the sense that professionals agree on a reason to exist, i.e. a practical need, and a set of standards, i.e. defined competence (Ellett, 2012). This cognitive process is deliberative judgement: theoretical reasoning governed by the rules of formal deductive logic (Ellett, 2012).

3.3.2 Techne

In organization studies, techne is social practice. This idea is built on a constructionist interpretation of knowledge where the professional's theoretical knowledge (episteme) is adapted to the unique 'social, cultural, and historical context' of their organization (Higgs, 2012: 80). Professional practice is constantly evolving (Higgs, 2012) as professionals are given autonomy, i.e. to practice judgement (Ellett, 2012), and standards are revised and improved (Higgs, 2012). Professionals, therefore, have scope to build upon existing practice by using their individual judgement to improve upon theory and standards. This cognitive reasoning is informed practice: where professionals understand the nature of their knowledge and its creation (episteme) and can adapt this to their own practice model (techne) that 'guides and gives credibility' to their knowledge (Higgs, 2012: 79-80).

3.3.3 Phronesis

In organization studies, phronesis is morally virtuous decisions. According to Tsoukas and Cummings, (1997), Aristotle believed that both craft knowledge (techne) and practical wisdom (phronesis) are types of practical knowledge, in contrast to scientific knowledge (episteme) which is theoretical. The difference between techne and phronesis is action and production. Techne is used to produce things and the object produced is the end in itself. Phronesis is used to act. There is a relationship between acting and the standards against which the acting is judged (Tsoukas and Cummings, 1997). These standards do not apply to the production of objects. Techne is judged by the quality of the product itself, and by the steps taken to achieve the product, i.e. the technical processes. The standards used to judge actions associated with phronesis are based on the most reasonable way to act.

Phronesis has both an intellectual virtue and an ethical virtue (Eikeland, 2008, p. 53). For Aristotle, practical knowledge and moral virtues go together: it is impossible to be practically wise without being good (Van de ven and Johnson, 2006). The cognitive reasoning which distinguishes phronesis from techne is knowing the right values (Tsoukas and Cummings, 1997). These values are determined by the professional's sense of Eudaimonia. Eudaimonia requires 'excellence of character', i.e. virtue (Bredillet, et al,. 2014: 21). It is social practice meaning that if a person knew the most reasonable way to act, they would do so (Ellett, 2012). These actions are guided by values associated with a sense of what is the right thing to do for humanity, being a good person, and living a good life.

For Aristotle, techne is subordinate to phronesis (Van de ven and Johnson, 2006). Eudaimonia also involves intellectual excellence, i.e. reason and rational activity (Bredillet, et al,. 2014: 21). This reasoning involves both cognitive and affective dimensions. The cognitive dimension is knowing how to achieve Eudaimonia. It is possible for a professional to know the right values without knowing how to achieve them in practice (Van de ven and Johnson, 2006). The affective dimension is knowing why to achieve Eudaimonia. It is possible for a professional to know how to achieve Eudaimonia but choose not to (Van de ven and Johnson, 2006). This decision involves more than motivation to do the right thing. Phronesis does not have motivational hedonism and rational egoism (Ellett, 2012). The moral virtue of phronesis is not about personal gain, rather it is a higher goal loosely described as the profession's ends, or society's well-being (Ellett, 2012). Therefore this higher motivation has both cognitive and affective elements. The former is the ability to deliberate well and make good judgements, while the latter is about attitude (Ellett, 2012).

4. Conceptualisation

This paper's conceptualisation combines two existing theories - Practical Wisdom and Intellectual Capital - to propose a new theory of intangible assets. The aim is to contribute to a fifth stage of intellectual capital (IC) research with a new conceptualisation of IC as practical wisdom. Given practical wisdom includes Eudaimonia, the conceptualisation should help us understand how sustainability occurs in practice (Massaro, et al., 2018). This focus on sustainability aligns with the fifth stage of IC research agenda.

The conceptualisation examines how the three dimensions of practical wisdom - episteme, techne, and phronesis - fit the three dimensions of intellectual capital - human, structural, and relational. In doing so, the paper proposes discussion around these questions:

- Do the three dimensions of practical wisdom - episteme, techne, and phronesis - and the three dimensions of intellectual capital represent - HC, StC and RC - the same things or are they different?
- Do they combine to represents elements of one another?
- Are the IC capitals only knowledge or do they meet the criteria of practical wisdom?
- Do the IC capitals represent practical wisdom on their own or in combination?
- If so, what might a new theory of IC look like?

Figure 1 presents this paper's conceptualisation of intellectual capital as practical wisdom:
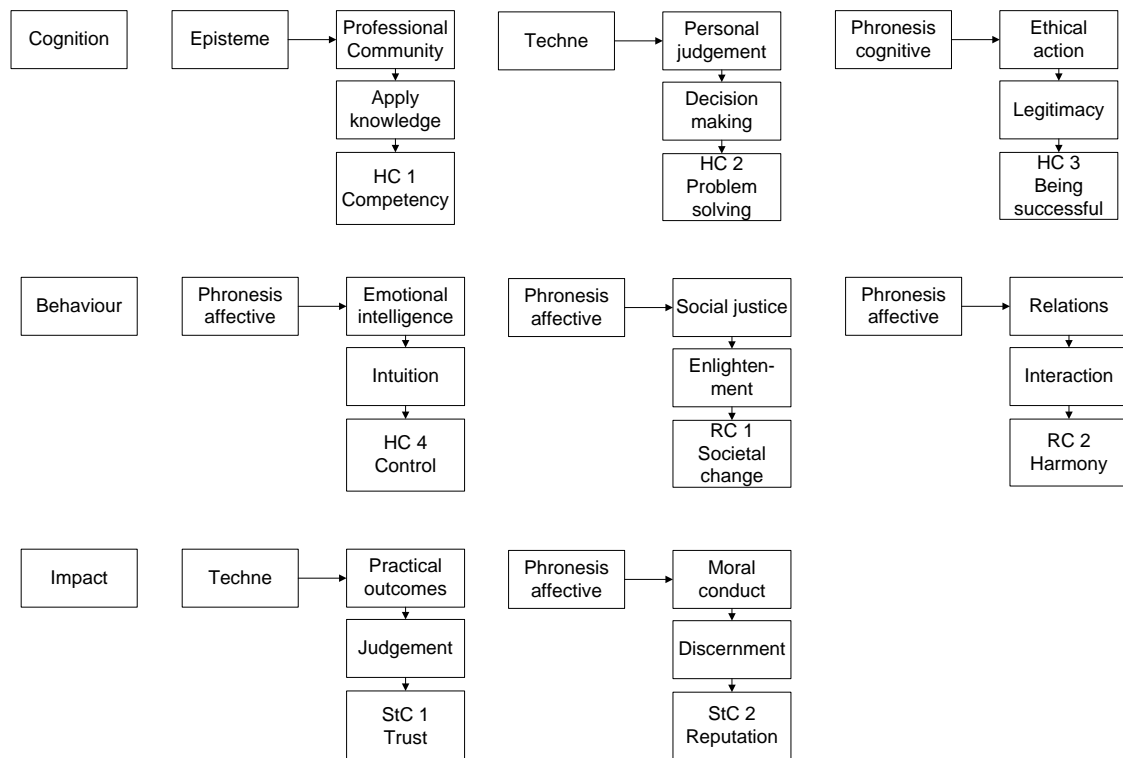
Figure 1: Conceptualisation of intellectual capitals as practical wisdom

5. Discussion

5.1 Theorisation

Figure 1 allows us to reframe IC theory to consider the IC capitals as practical wisdom. This conceptualisation help us better understand the value of the IC capitals. The framework is useful theoretically because it (a) disaggregates IC into components, (b) disaggregates practical wisdom into components, (c) maps the relationships between the two theories' components, and (d) allows causality to be inferred. On the latter point, causality is one of the biggest challenges facing IC research (see Dierickx and Cool, 1989; Guthrie et al., 2012). Practitioners would be interested in any framework that helps them understand the network of causally ambiguous resource relationships that influence a firm's performance. Figure 1's left-hand-side positions the framework in terms that practitioners can quickly associate with, i.e. cognition, behaviour, and impact. As we move across each row of Figure 1, the framework begins with the practical wisdom components, e.g. episteme. For each practical wisdom component, we then move first across to identify the knowledge, and then downwards to identify the wisdom. For the first component, episteme, the knowledge is provided by the professional community, e.g. the standards of professional practice learned at university (degree qualifications), and set by industry bodies (e.g. CPA for accountants). Wisdom is created by applying this knowledge in the workplace, i.e. gaining practical experience. The final box is the connection to IC which in the case of this first component - episteme - is HC1 competency. Competency is the measure of this component of practical wisdom.

There are several conclusions that may be drawn against the questions posed in the conceptualisation section.

- The three dimensions of practical wisdom - episteme, techne, and phronesis - and the three dimensions of intellectual capital - HC, StC and RC - do not represent the same things. There is not a straight swap between the two theories, in other words, episteme is not human capital, techne is not structural capital, and phronesis is not relational capital. However, they are related.

- They do they combine to represents elements of one another. This occurs at several levels.

- *First, there are three components of practical wisdom which combine to provide cognition related to professional practice; three other components combine to provide behaviour; and then two combine to provide impact.*

- *Second, there are different types of knowledge (first box), and wisdom (second box) which combine to provide each component of practical wisdom.*

- *Third, there are different types of IC which combine to measure each component. This occurs at further levels. For example, cognition combines different types of HC, but behaviour combines another type of HC with two types of RC.*

- The IC capitals do they meet the criteria of being practical wisdom. However, the IC capitals do not represent practical wisdom on their own, rather they create practical wisdom in combination with knowledge and different types of capitals.

5.2 Outcomes

The proposed fifth stage of IC research needs to have relevance for practitioners if it is to survive. This paper has proposed that one way to find relevance is to develop a framework that assists any organisation develop sustainability. There has been increasing recognition by many organisations of the strategic importance of corporate social responsibility (Dumay, 2016), and of being a sustainable organisation. Sustainability is a morally correct thing to do. Therefore, sustainability fits very nicely with the theory of practical wisdom, particularly the ethical virtues of Eudaimonia. A framework that measures Eudaimonia should be of interest to many practitioners. This paper's framework (see Figure 1) provides ideas about how to understand practical wisdom within the context of professional practice.

The utility of the framework is summarised below:

Cognition variables

- Episteme is about measuring competency against the professional community standards. HC1's wisdom is about how the workforce applies knowledge in professional practice.

- Techne judgement is about making good choices. HC2's wisdom is about continual improvement in professional practice.

- Phronesis ethical action is capacity to determine the best way to do things, i.e. double-loop learning. HC3's wisdom is about truth in professional practice.

Behavioural variables:

- Phronesis emotional intelligence is about dealing with difficult people or situations. HC4's wisdom is professional practice with a positive organisational culture.

- Phronesis social justice is about positive self-identity. RC1's wisdom is about professional practice characterised by meaning and purpose.

- Phronesis relations is about natural justice, work-life balance, and listening to others. RC2's wisdom is about professional practice characterised by positive social capital.

Impact variables:

- Techne practice is about doing things right, i.e. single-loop learning. StC1's wisdom is about making professional practice consistent best practice.

- Phronesis morality is about focusing on things that matter. StC2's wisdom is about professional practice seen as a role model by others.

From an IC perspective, the framework defines HC in terms of competency and higher levels skills: episteme and techne. StC is the ability to access organisational knowledge so you know you are doing the right thing, techne practice; and the ability to contribute, i.e. share experience which may then be codified and shared with others as best practice, i.e. techne cognitive. RC is the capacity to work well with others and act with intellectual and ethical virtue, to be a good person at work, to achieve Eudaimonia.

6. Conclusions

This paper has contributed to a fifth stage of intellectual capital (IC) research with a new conceptualisation of IC as practical wisdom. We feel that practitioners would be interested in understanding, measuring, and managing practice wisdom. With increasing focus on corporate social responsibility, phronesis in particular should be interesting to businesses. From a theoretical perspective, we feel that framing the IC capitals as practical wisdom

makes a significant contribution to the field of IC research. We believe that this progresses the field towards a better understanding of the value of intangible assets, and contribute to better linkages with organisational performance and growth. There are plenty of opportunities for further research on this topic. What are the implications if episteme, techne, or phronesis stocks are higher or lower than expected? What strategies may be introduced to grow each of the elements of this framework (see boxes in Figure 1)? What empirical evidence may be provided to prove that high levels of any or all of these elements improve an organisation's performance in sustainability?

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Knowledge Management Antecedents, Processes, Innovation Capability and Organizational Performance: An Empirical Investigation

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Abstract: This study formulates a comprehensive conceptual framework which encompasses knowledge management antecedents (organizational culture, leadership, organizational structure and information technology), knowledge management processes (knowledge creation, sharing, storage and documentation and acquisition), innovation capability (product, process, marketing and organizational innovation), and organizational performance (product quality, operational performance and financial performance). Then, empirical testing of the relationships among the study variables with the focus on the mediating role of innovation capability was conducted. The sample of this study encompasses the mid-level managers of the organizations. 440 self-administered questionnaires were distributed among the respondents. Confirmatory factor analysis is undertaken to assess statistically the validity of the study measures. Then the structural equation modelling (SEM) path analysis was used to assess the structural relationship of knowledge management antecedents (KMA), knowledge management processes (KMP), innovation capability (IC), and organizational performance (OP). The results of the study reveal that engagement in KMA, KMP can lead to better IC in the organizations which in turn, can lead to better OP. The results observed concerning this sample of companies may not be applicable to a greater population of companies from other countries with a different technological base. Moreover, the study represents only snapshots since it utilized self-administered questionnaires which also have no qualitative data, therefore, longitudinal study would be recommended. For the practicing managers intending to increase the rate of innovation in their firms, this means that KMA and KMP are important activities to master. Additionally, managers should put additional emphasis on innovation as it is an important element for achieving improved overall firm performance and sustainable competitive power. There are some studies discussing how the antecedents of knowledge management and KMP are positively related to innovation, but an examination of the impact of the KMA (as I conceptualize the four it in this study) and KMP; on the IC of organizations which in turn impact OP has never been done.

Keywords: knowledge management antecedents, knowledge management processes, innovation capability, organizational performance, Jordan

1. Introduction

Prior studies identified that systematically managing knowledge enablers allows enterprises to effectively integrate the operation model of KM (Alavi and Leidner, 2001; Chen and Chen, 2005; Ho, 2009; Lee et al., 2005; Whelan and Carcary, 2011).

As the ecological view of KM indicates, a well-established knowledge management systems, relies not only on technology, but also social ecology, such as culture, process, and structure (Gupta and Govindarajan, 2000). This view also considers that taking a process approach can better explore the knowledge of ecological systems of firms (Chen et al., 2010).

However, the impact of knowledge antecedents on the operation of organizational KM processes still remains largely unexplored. Therefore, this study adopts the process view to explore knowledge antecedents' abilities to improve KMP performance.

Innovation capability (IC) is one of the most important dynamics that enables organizations to achieve a high level of competitiveness both in the national and international market. Thus, how to promote and sustain an improved innovation capability should be the key focus area of the top managers of the organizations.

Innovation capability has been suggested to be a multi-faceted construct. The categories used in the area of IC often adopt a certain type of innovation, such as product innovation or process innovation, instead of the overall innovation capability (Ibrahim et al., 2009). The effects of IC to firm performance have usually been studied by using the previously mentioned categories. The empirical studies that discuss the organizational innovation

capability (i.e. the aspects that affect managing innovation) as a whole and its impacts are rare. It is apparent that much more conceptual and empirical work will be needed to examine the impact of overall innovation capability on firm performance dimensions (Loof et al., 2002; Sadikoglu and Zehir, 2010). Therefore, many authors (Evangelista and Vezzani, 2010;

Gunday et al., 2011; Li et al., 2012) suggest future research in order to validate previous research findings. Thus, the question that have remained unsolved is does the individual aspects of IC together have an impact on the performance of a firm.

The objective of this research is to study the relationship between organizational innovation capability and organizational performance. The study contributes to the current understanding by presenting the important aspects of organizational innovation capability that affect firm performance. The effects are studied to both financial and operational performance.

Organizational survival is determined by performance, which is at the core of all the activities that are undertaken by the organization (Abdalkrim, 2013; Choudhary et al., 2013).The ultimate criterion variable of interest for researchers in any area of management is organizational performance (Richard et al., 2009). In the current context of global and highly competitive markets, performance evaluation has become an element of great importance in the development of strategies of organizations. Performance evaluation can be defined as the process to quantify the efficiency and effectiveness of production systems (Singh and Garg, 2008). The following section presents theory and hypotheses, section 3 presents the mediation role of IC between KMP and OP, section 4 presents the methodology, finally, section 5 presents results and discussion

2. Theory and hypotheses

2.1 The relationship between KMA and KMP

Edvinsson and Sullivan (1996) suggested a model that recognizes the significance of culture in managing knowledge by proposing that culture be considered part of the intangible structural capital that facilitates the sharing of knowledge. The cultivation of a knowledge sharing culture is an important enabler of knowledge sharing (Chugh, 2018).

Knowledge Management Antecedents
Organizational culture
Leadership style
* Organizational structure*
Information technology

Knowledge Management Processes
Knowledge creation
* Knowledge sharing*
knowledge storage and documentation
* Knowledge acquisition*

Innovation Capability
Product
Process
Marketing
Organizational

Organizational performance
Financial
Operational
Product

Figure 1: Study model

Such a supportive culture of knowledge management is expected to further improve the successful implementation of knowledge management practices (see, for example, Adeinat and Abdulefattah, 2019; Chang and Lin, 2015; Kulkarni *et al.*, 2006/2007; Lopez *et al.*, 2004). Without a supportive organizational culture, KM initiatives will not be successful (Park *et al.*, 2004).

There are numerous researchers who support the influence of leadership styles in the processes of organizational knowledge (Singh, 2008; rodríguez Ponce, 2010; Analoui et al., 2013; Birasnav, 2013).

According to these authors, consultative and delegative leadership proposed by Hershey and Blanchard (1982), and transformational and transactional leadership proposed by Avolio and Bass (2004), help in the enhancement of knowledge processes. According to Farrell (2017), knowledge creation is based on information and

communication so a leader will need to ensure that information and data is collected and made available for an organization. Leaders will need to encourage that knowledge is shared through documentation, published policies, reports, and meeting notes.

The relationship between IT and KM is based on the premise that IT enhances KM in a way that it facilitates sharing of information and knowledge. IT support for KM allows an organization to create, store, share and use knowledge more effectively and efficiently (Wang et al., 2007. Technology represents key facilitator that enables explicit knowledge to be formalized and articulated, as well as codified (Chen and Huang, 2012).

Structure can influence KM processes through shaping patterns and frequencies of communication among organizational members, stipulating locations of decision-making, and affecting efficiency and effectiveness in implementing new ideas.The organizational structure, usually formed on the basis of organizational operations, can either encourage the KM operation in the organization, or become a hindrance (Lee and Choi, 2003). Flexibility in the organizational structure can promote knowledge sharing within an organization, along with knowledge operations across the boundaries separating all organizational stakeholders (Gold et al., 2001).

2.2 The relationship between KMP and innovation capability

KM is not solely focused on innovation, but it creates an environment that causes the innovation to take place (Plessis, 2007). According to Shang *et al.* (2009), knowledge is both learned and exploited for business enhancement and innovation. Involvement in the acquisition, transfer, and application of knowledge supports employees to utilize organizational resources, improves their innovative ability, and promotes firm innovation (Chen and Huang, 2009; Darroch, 2005). Additionally, Huang and Li (2009) suggested that firms can prompt the sharing, application and deployment of knowledge to facilitate innovation, as KM has a positive effect and contribution to transform tacit knowledge into innovative products, services and processes, which improve innovative performance. Specifically, a firm with proficiency in gathering and integrating knowledge is more likely to be unique, rare, and difficult for rivals to replicate, and hence has the potential to sustain high levels of firm innovation capability.

2.3 The relationship between KMP and organizational performance

KM is seen as beneficial to organizations in many ways such as in its ability to optimize organizational performance. For instance, knowledge creation is expected to provide a positive contribution to convert tacit knowledge into innovative products, services and processes, and thus, ultimately, result in increased organizational performance. Knowledge sharing can have contributions to reduction of production costs, faster completion of development projects, improvement of decision-making and coordination in results, the ability to innovate, an increase in sales or income from new products and services (Huang et al., 2010; Chen et al., 2017).

The relationship between companies in the same chain involves the transfer of activities and dissemination of knowledge. By accessing the valuable knowledge facilitated by these relationships, organizations can develop new capabilities and opportunities (Cheng and Fu, 2013), which constitutes an important means of achieving competitive advantage in highly changeable environments (Chen *et al.*, 2014).

KM can carry over the structural impact onto organizational effectiveness, because the way knowledge is organized, KM activities are coordinated, and the extent to which KM practices are embedded in the daily work processes influence the effectiveness and efficiency of organizational performance.

Knowledge storage and documentation can lead to enhanced performance; IT-based knowledge management systems have become an essential part of virtually all established organizations yet as Palanisamy (2008) observed, "The process of knowledge storage does not necessarily lead to enhanced performance . . . The performance depends on applying the stored knowledge of individuals into effective actions" (p. 105).

2.4 The relationship between KMA and organizational performance

An organizational culture that supports knowledge management can lead to more effective accomplishments. Instilling a culture of standardizing and maintaining information is significant for the achievement of organizational goals (McManus and Loughridge, 2002).

Organizational culture is the most critical factor that shapes behavior. Hooijberg and Petrock (1993) stated that culture contributes to improved performance and supports self-managing work teams. Robinson et al. (2005) indicated that learning culture and knowledge management strategies are crucial to enhancing corporate performance for an enterprise to keep being innovative in its processes, products, and technologies. Research has shown significant influence of organizational culture on subjective organizational performance, however, there has been some, albeit limited empirical support for the effect of culture on objective organizational performance (Wilderom et al., 2012; Xenikou and Simosi, 2006; Uzkurt et l., 2013).

Wolf (2002) stated that structure has a direct effect on the success of an organization's operational strategy. "Good organization structure influences the execution behaviours of a company. Structure not only shapes the competence of the organization, but also the processes that shape performance". Thompson (1966) opines that "structure is the internal differentiation and patterning of relationships". He stated that structure is an avenue for the organization to set standards and boundaries for efficient performance by employees, by delegating roles, control over resources, and other matters.

Leadership style has been highlighted as a strategic and critical factor for successful organizational performance, especially in knowledge management area (Nonaka and Takeuchi, 1995). Employees in leadership positions become responsible for developing and maintaining motivational features in their followers, seeking superior organizational performance (Sant'anna et al., 2012). Somech (2006) found that leadership styles and participatory leadership directly impact the process of functioning of a heterogeneous team, promoting team reflection and innovation. Shen and Chen (2007) showed that leadership had a positive effect on team confidence and performance in a large-scale study conducted in Taiwan's manufacturing and service industries.

IT is assuming a decisive role in KM and is one of the most important tools, which is used to decide, to fight competitors, and to catch target markets. In fact, adequate software can capture and distribute to knowledge workers all the useful information the company has stored over time. Understanding, interpretation, and the use of IT may enable a possible competitive advantage to be identified and obtained (Carneiro, 2000). Wang et al. (2007) discussed that IT influences KM in a way that it enhances firm's capability of handling their knowledge to cope with the changing business environment and, in turn, influences firm performance.

3. The mediating role of innovation capability between KMP and organizational performance

Innovation has a significant impact on the O's P by enabling a better position in the market, which in turn will give it a competitive advantage and a better performance (Walker, 2008). Previous researchers have tested the association between innovations and OP and have found significant positive relationships. However, according to Gunday et al. (2011), most researchers consider only one or two types of innovation, instead of considering the different types simultaneously, exploiting then its impact on performance. For instance, Ar and Baki (2011) found that product and process innovations led to superior performance where performance was measured by sales, market share and profitability. Rosli and Sidek's (2013) study revealed a positive impact of product and process innovations on firms' performance in manufacturing sector in Malaysia but no direct relationship between market innovations and firms' performance were established. Salim and Sulaiman (2011) focused on ICT companies in Malaysia and confirmed the same results. Yet, another study done in Kenya, Ndalira et al. (2013) revealed that innovations influenced the growth of garment SMEs.

Hajar (2015) examined the relationship between innovation and performance and found a positive and significant effect between innovation and the firm's performance. Saunila and Ukko (2012) observe the impact of IC on OP by measuring innovation capability and OP. According to Garcia-Morales et al. (2018), it is especially relevant in technology organizations, where greater organizational innovation facilitates achievement of the organizational capabilities needed to respond better to competitive challenges, increasing OP for sustainable competitive advantage (Antoncic and Prodan, 2008; Kollman and Stöckmann, 2014; Leonard-Barton and Deschamps, 1988; Zaltman et al., 1973).

4. Methodology

4.1 Data collection and sample

Data were collected through the survey instrument in order to test the hypotheses of the study.

The questionnaires were distributed among 210 Jordanian manufacturing and service organizations. The sample of this study encompasses the mid-level managers of the organizations. 440 self-administered questionnaires were distributed among the respondents. 280 questionnaires were return. Of which 273 were good to be used for analysis, hence the response rate is about 62 %.

4.2 Measurement

KMP measures were adapted from Andreeva and Kianto (2011). Five items were used to measure knowledge sharing, four measures for knowledge creation, four items for measure knowledge storage and documentation and three measures for knowledge acquisition.

IC construct measures were adopted from Kafetzopoulos and Psomas (2015). Product innovation variable was measured by six measures and process innovation variable was measured by five. Marketing innovation measured and organizational innovation were measured by five items respectively. Finally, OP measures were adopted from Kafetzopoulos and Psomas (2015). Five measures were used to measure product quality and operational performance respectively, and financial performance was measured by six items.

4.3 Validity and reliability

Confirmatory factor analyses were conducted in order to test convergent and discriminant validity of measurement items. Convergent validity was evaluated according to factor loading, composite construct reliability and average variance extracted (Hair et al., 2006). All standardized factor loadings were greater than (0.50) and composite reliability (CR >0.6), and average variance extracted (AVE > 0.5). Therefore, all constructs have adequate convergent validity.

To confirm discriminant validity, Table (1) presents the comparison between the square root of the AVEs and the inter-construct correlation. Since the square root of the AVEs for all constructs are greater than the related construct correlations, discriminant validity is confirmed (Fornell and Larcker, 1981).

Cronbach's alpha (α) measures were calculated to assess the reliability, since each alpha exceeded 0.7, reliability is confirmed (Nunnally, 1978).

5. Results and discussion

5.1 Descriptive statistics

The aim of this research was to examine the impact of KM antecedents (organizational culture, leadership, organizational structure and information technology) on knowledge management processes. Also, study the mediating role of IC between KMP and OP. To examine the research hypotheses, SEM was utilized in addition to using AMOS 22.0.Table 1 and Figure 2 depicts the SEM path results, standardized path coefficients and t-values of study hypothesis according to model 1. The model fit indices are χ^2/DF= 1.879, CFI = 0.961, RMSEA = 0.068, and SRMR = 0.0551. These indices are acceptable (Hu and Bentler, 1999).

For this purpose, we examined KM antecedents in terms of four constructs: organizational culture, leadership, organizational structure and IT. H1 posited that KM antecedents influence KMP. The results provide support for Hypothesis 1 (β=0.611, p<0.01). The result is consistent with Abdulefattah, 2019; Chang and Lin, 2015; Birasnav, 2013; Chen and Huang, 2012). H2 states that KMP which were examined in terms of four constructs (knowledge creation, sharing, storage and documentation and acquisition) influence IC. The coefficient for this path is significant (β=0.534, p<0.01) supports Hypothesis 2. The result is consistent with (Chen and Huang, 2009; Darroch, 2005).

In addition, H3 suggests that the IC influences the OP. The results of coefficient for this path is significant which provides support for Hypothesis 3 (β=0.560, p<0.01). The result is consistent with Hajar, 2015; Saunila and Ukko, 2012; Garcia-Morales et al., 2018)

Finally, H4 postulates that KMP influence the firm performance. The results of coefficient for this path is significant which provides support for Hypothesis 4 (β=0.217, p<0.01). The result is consistent with Uzkurt et l., 2013; Thompson, 1966; Sant'anna et al., 2012; Wang et al., 2007).
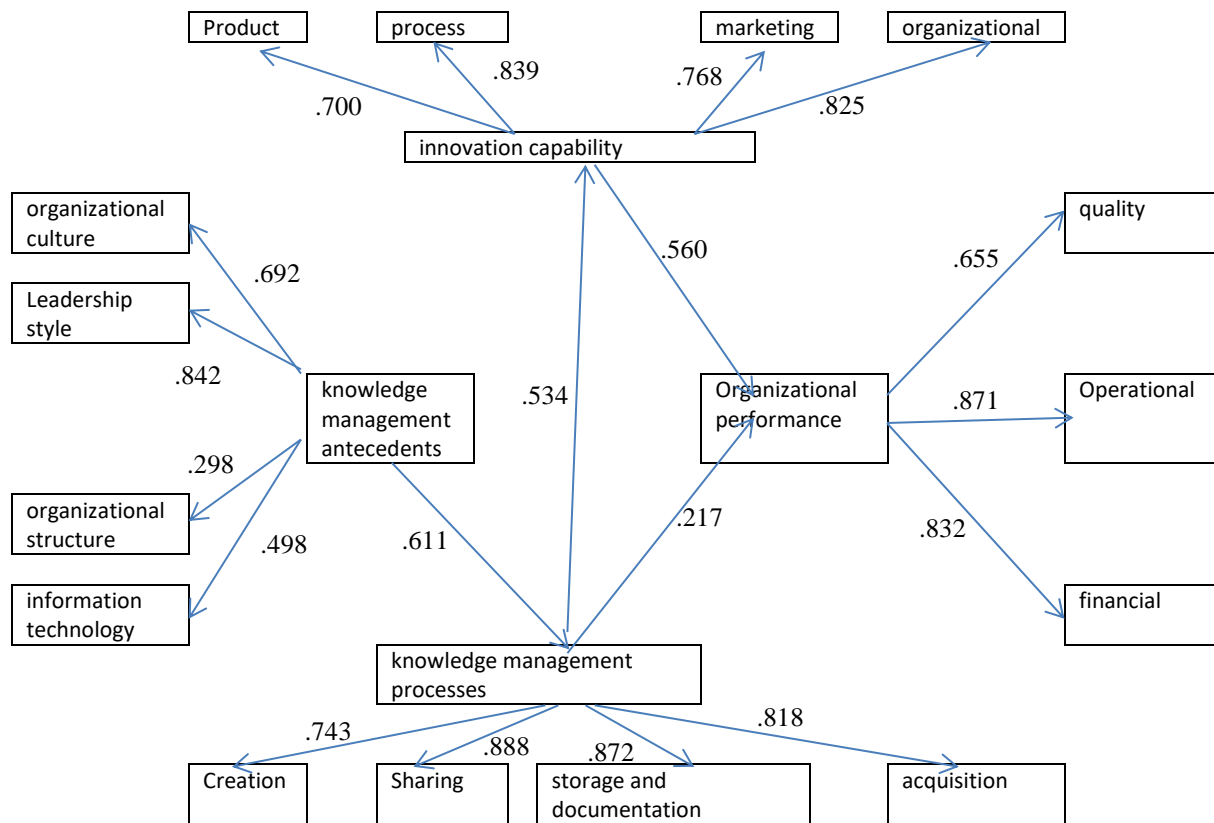
Figure 2: Hypotheses testing results

Table 1: Path analysis for the constructs of the study

	Relation		Coefficients	CR	Support/ non-support
Ath	OC	KMA	0.696	A	Support
	LA	KMA	0.842	8.069	Support
	OS	KMA	0.298	4.037	Support
	IT	KMA	0.498	6.256	Support
	KMP	KMA	0.611	7.138	Support
	KC	KMP	0.743	11.932	Support
	KS	KMP	0.888	15.784	Support
	KSD	KMP	0.872	A	Support
	KA	KMP	0.818	14.046	Support
	IC	KMP	0.534	6.427	Support
	PERF	KMP	0.217	2.675	Support
	PT	IC	0.700	A	Support
	PS	IC	0.839	10.685	Support
	MT	IC	0.768	9.875	Support
	OL	IC	0.825	10.541	Support
	PERF	IC	0.560	5.938	Support
	F- PERF	PERF	0.832	A	Support
	O- PERF	PERF	0.871	12.463	Support
	P- PERF	PERF	0.655	9.497	Support
Explained variance proportion R^2 of KMP equal .374					
Explained variance proportion R^2 of IC equal .285					
Explained variance proportion R^2 of Organizational performance equal .491					

Note: 1. *: C.R. (critical ratio) 1.96; using a significant level of 0.05, critical ratios that exceed 1.96 would be considered significant. A: the parameter compared by others is set as 1;. The coefficients are standardized value.

6. Summary

This study formulates a comprehensive and delineate conceptual framework which encompasses knowledge management antecedents (organizational culture, leadership, organizational structure and information technology), knowledge management processes (knowledge creation, sharing, storage and documentation and acquisition), innovation capability (product, process, marketing and organizational innovation), and organizational performance (product quality, operational performance and financial performance). Then, empirical testing of the relationships among the study variables with the focus on the mediating role of innovation capability was conducted. The sample of this study encompasses the mid-level managers of the organizations. 440 self-administered questionnaires were distributed among the respondents. Confirmatory factor analysis is undertaken to assess statistically the validity of the study measures. Then the structural equation modelling path analysis was used to assess the structural relationship of knowledge management antecedents, knowledge management processes, innovation capability, and organizational performance. The results of the study reveal that engagement in KMA, KMP can lead to better IC in the organizations which in turn, can lead to better OP.

7. Conclusion

This study indicates that in order to build a successful KM initiative, organizations need to develop key KM enablers or KM antecedents; hence, organizations need to secure leadership involvement first. Next, the selection of a competent and committed leader is important for the initiative because the leader plays a critical role in securing funds and building technology infrastructure to accomplish KMP goals and objectives. Additionally, organizations must recognize that developing both organizational structure and culture that promote communication and trust among the employees would facilitate accomplishing KM goals such as collaboration and knowledge sharing among employees.

This study also provides a mechanism by which KMP contribute to innovation capability and OP. KM remains a fundamental factor that promotes innovations in organizations. This is true because the generation of new ideas is through proper management of knowledge which is a seed of innovations. The mediator role of IC is also confirmed. As we see in the analysis, although both KMP and IC have positive and significant effects on organizational performance, innovation capability has a higher effect. Consequently, we can get a better result if we use IC as the mediating variable between KMP and OP.

This study offers a new insight that IC makes KMP a valuable tool in achieving superiority in performance. In fact, IC plays a specific role between KMP and performance. In particular KMP are necessary, but not sufficient for superiority in performance, while the potential value of KMP is realized through effective IC. This implies that knowledge resources that are acquired, shared and applied must be used to improve the quality of products, production processes and markets in order to achieve improved business performance.

Finally, compared to existing literature, the present study practically depicts the effects of KMP on IC and OP. Using this study, firms can evaluate the positive impact of KMP on IC and OP.

8. Limitations and future research

The results I observe concerning this sample of companies may not be applicable to a greater population of companies from other countries with a different technological base. Moreover, the study represents only snapshots since it utilized self-administered questionnaires which also have no qualitative data, therefore, longitudinal study would be recommended to future studies on the subject in order to compare any long-term variations in the results. Alternatively, qualitative studies could be conducted to supplement the quantitative findings because through methodological triangulation, it may be possible to gain a better understanding of the mediating effect of innovations on the relationship between KMP and organizational performance. Furthermore, other antecedents of KMP such as human resource management, organizational learning and organizational strategy are highly recommended to be included in the future studies.

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Co-Creation in the Public Sector: A Tool for Innovation

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Abstract: The institutional mission of the Public Administration is the creation of public value for citizens and businesses. It is possible to improve public sector services by innovating and implementing new solutions to meet collective needs. This paper addresses the issue of co-creation as an indispensable tool to innovate the public sector from a Service-Dominant (S-D) perspective. With co-creation, the Public Administration would respond to the need to adopt a new approach to the creation of value through the delivery of public services, in which the production process of the service is no longer entrusted only to administrative bodies, but takes place in a participatory perspective: public administrations and users mutually share resources, responsibilities and results pursuing the goal of the "common good". The Service-Dominant (S-D) approach, in turn, can contribute to the innovation of organisational processes and the improvement of services to citizens, the promotion of social inclusion, the generation of wealth in territories and the creation of new jobs. The empirical strategy consists of case studies of co-creation example in the S-D logic from the RegioStars Awards, the most important EU award for innovative regional development projects, in the period 2014-2018. Indeed, RegioStars reward excellence in regional development and highlight original and innovative projects, that become the standard-bearer of regional policy and its achievements.

Keywords: regional policy, value co –creation, service –dominant logic

1. Introduction

Innovation in the public sector is key to improving economic performance, social welfare and environmental sustainability and can also increase organisational efficiency and lead to better quality levels, more citizen-friendly services, reduced business transaction costs and new business methods (Commonwealth of Australia, 2009).

Mulgan and Albury (2003) define innovation in public services as a tool for designing and implementing new processes, products, services and delivery methods resulting in significant improvements in efficiency, effectiveness or quality. It also promotes employment and well-being in the community.

In the last few years actions supporting innovation have also been increasingly emphasized in the development of public services (Albury, 2005 ; Sundbo and Toivonen, 2011). Public administration managers are constantly looking for innovative projects that can improve the performance of public services and greater interaction with citizens.

The need has emerged for the Public Administration to adopt a new approach to the creation of value through the provision of public services, which no longer sees the administrative bodies as solely responsible for the creation of the service, but which reconsiders the entire process of production of the service in a participatory perspective in which public administrations and users share resources, responsibilities and results with each other, pursuing the objective of the common good. The user's participation is thus part of the processes of public value creation which change their logic of value creation embracing a new one, that of co-creation.

Valotti (2005) sees public administrations as "open yards of managerial innovation", in the definition of a broader context of change in the principles underlying the organisation and management of the State's administrative apparatus.

In the public context, however, it seems that innovation is sometimes badly tolerated and seen as an obstacle to growth. In almost every country in the world, governments are under pressure to reform their administrative structures and restructure their processes to change the criteria and scope of their operations through the introduction of innovations (Pinto, 1998).

Public organisations should build their individual capacities through skills, mentalities and leadership, because they are necessary for successful innovation. Nevertheless, there is a preconceived notion that innovation is difficult to achieve and the public sector is not as innovative as it should be.

Although the empirical evidence gathered in recent years on the use of innovation in public services shows the contrary, some authors expose that failure rates in service innovation are high (van Riel, Semeijn, Hammedi, & Henseler, 2011).

In recent decades that public sector companies have embarked on a profound transformation process with the aim of improving performance and regaining the trust of their stakeholders. However, innovation in the public sector is largely characterised by high levels of impatience with change; restrictive limitations on available resources; lack of management and measurement guidelines; conflicts over policy indications; resistance to change and legislative limitations (Commonwealth of Australia, 2010).

The adoption of innovations on the market can represent a risk for States because it can compromise social responsibilities (Pinto, 1998).

The aim of this work is to investigate the phenomenon of co-creation of value as a tool for innovation in the public sector. It is organized in a theoretical part on two topics - co-creation and Service Dominant Logic – and an empirical part based on case studies from RegioStars Awards, the most important EU award for innovative projects of regional development.

2. Co-Creation: The tool for innovation in the public sector

In recent years, there has been a general change in the mindset for the management of organizations that has led both the literature on services and that on public administration to consider the adoption of a collaborative logic in an attempt to seek the production of value as a result of joint efforts of providers and users. From the developments of these theoretical reflections, developed mainly in the private sector, new concepts have emerged such as those of value, co-creation and citizen involvement. In view of the growing importance of these issues, many scholars have tried to understand how these new concepts, developed in the context of private organizations, could find application in the more complex public context.

Creating value is the primary objective of any type of organisation, whether public or private. In view of the growing importance that the concept of value has acquired in the private sector by animating the debates of economists and business leaders, this concept has also become increasingly important in the public sector.

The concept of public value was formulated for the first time by Moore (1995, p.297), who defined public value as the implementation and concretization of the collective aspirations and needs of citizens and their elected representatives, obtained through the action of public bodies. Moore (1994) hypothesized a new role for managers as interpreters of the aspirations of the community, transforming their figure from mere executors of the decisions of the administrative bodies to real contributors to these aspirations.

Even if in public management literature the co-production perspective is still dominant, there is a growing strand of work that is arguing for a shift away from this perspective and towards value co-creation (Osborne, 2018, p. 228)

Co-creation can be considered as the involvement of citizens in the initiation and/or the design of public services to develop beneficial outcomes (Voorberg, Bekkers, & Tummers, 2015, p. 1347). In this process, citizen play a relevant role, because have specific resources and competences which are valuable for re-designing public service delivery (e.g. Parrado et al, 2013). According to Voorberg et al. (2017), given that citizens in the process of co-creation are actively engaged in building resilient societies, the process of learning is crucial. Public sector innovation stems from the need for governments to stimulate and value the responsiveness of the services provided to meet individual and local needs through the service stailored to meet the individual needs of citizens and locals (Alves, 2012). Co-creation is often explicitly considered in relation to service reform and innovation (Elg et al. 2012; Alves 2013). And even public managers and politicians are increasingly taking up co-creation with citizens as a way to address many of the public sector's needs while innovating.

3. Co-Creation in service dominant logic

Service-Dominant Logic (SDL) provides a theoretical basis and framework for this shift of focus – from liner product-dominant production of public services and to interactive value co-creation and from the PSO to the service user as the central locus of value co-creation (Osborne, 2018, p. 226).

The emerging importance of services with respect to goods and the decisive role in the global economy increasingly stimulates scholars, professionals and business experts to engage in the search for models, paradigms and theoretical constructs able to describe more effectively the new processes of value generation. In this perspective, the Service-Dominant Logic (Vargo and Lush, 2008) represents a change of perspective with respect to traditional paradigms, able to overturn the existing link between goods and services, revisiting the considerations related to their exchange and subsequent use, rereading the concepts of value and its creation, reinterpreting the meanings of interaction, relationship and loyalty. SDL shifts the focus to service, understood as the application of skills by one entity to the benefit of another, in which the human component is configured as a key to value creation (Vargo and Lush, 2008). Value is no longer generated by economic exchange, but in a collaborative way through the mutual exchange of resources and knowledge made available by the various actors of the network at the time of use of the service. The value is therefore co-created at the time of interaction between skills, resources and skills of producers and stakeholders, assuming the dimension of "value in use". As in the private sector, the need to reread the services provided by the public administration emerges in the public sector, observing them no longer from the perspective of product orientation, but adopting a new logic, which takes into account both the organizations that provide public services and the relationships that exist between them and with stakeholders. The aim of the re-evaluation of the public service from a service-dominant point of view is in fact to direct the public decision-maker towards the most efficient possible delivery of services, in order to satisfy the needs of citizens who are fundamental players in the complex network of service provision.

4. Co – Creation and SDL: Cases from Regiostars Awards

For over 10 years, the European Community has introduced an award to enhance good practices in regional development and the collaborative process between public administrations and citizens through the tool of co-creation. The competition takes place every year in Brussels, where the winning project is awarded in each category. REGIOSTARS are awarded to projects carried out in five thematic categories (smart world, sustainability, inclusive growth, urban development and the topic of the year).

The RegioStars Awards have attracted in ten years over 1200 applications from across the whole of Europe; over 10 years, an independent jury has evaluated these applications before picking finalists and a winner in each category. The projects are evaluated by a technical committee made up of high-level academics.

The Awards ceremony takes place in Brussels during the European Week of Regions and Cities.

In the current year, REGIOSTARS will be awarded in five key areas for the future of EU regional policy: promoting digital transformation (smart growth); connecting green, blue and grey (sustainable growth); combating inequalities and poverty (inclusive growth); building climate-resilient cities (urban development); and modernising health services.

The project "Fifteen Cornwall: Launching a new life in the kitchen", winner of the RegioStars Awards 2014 in the "Inclusive Growth" category and presented by the Cornwall and Isles of Scilly regions, UK, is a good example to describe the importance of SDL logic. His passion for cooking has transformed the young lives of one of the poorest areas of England, and he has allowed access to jobs. Fifteen Cornwall is a co-creation project for the creation of a social enterprise, in the catering sector, which offers the unemployed disadvantaged between the ages of 16 and 24 an opportunity to study and train as a chef. This innovative initiative has trained nearly 130 young people, many of whom face serious challenges such as criminal history, substance abuse, mental illness or disability. About 89 young people have graduated as cooks and over 90% are still employed. Each year, the project invests about 1.2 million euros in the local economy, creating jobs for the vital tourism sector of the region (*European Commission - Commission announces winners of the 2014 RegioStars 2014 awards – www. ec.europa.eu*).

In 2015, the Regio Star Awards in the Inclusive Growth category: integrating people at risk of social exclusion into society, was won by the project "Rights at School" (Diritti a Scuola) by the Puglia Region (Italy). The Puglia region of Italy aims to raise levels of education and training in order to improve the confidence, life chances and future employability of its children and young people. One of the key tasks is to stop children leaving school too early in a region which has higher drop-out rates than the national average. "Diritti a Scuola" ensured the development of a new learning experience. The students didn't attend traditional lectures, instead they got

involved in active lessons where they were the protagonists. The teaching team helped students to improve their communication skills and together they helped create a very positive learning environment.

The "Diritti a scuola" project used a preventative approach to keep children in school, with a set of actions targeted mainly at primary school students and those completing their first two years of secondary education. Throughout the project, a high priority was given to helping children with disabilities and youngsters from disadvantaged backgrounds. Interventions were particularly focused on the schools with the highest drop-out rates. The project secured more than EUR 75 million from the ESF to help deliver two main actions: to improve the study of linguistics and science in primary schools; and to develop the teaching of Italian and mathematics in secondary schools. In addition to these mainstream activities, Diritti a scuola offered counselling, educational and vocational guidance, and intercultural mediation to students and their families. Particular attention was paid to providing these services to poorer students and those from migrant communities.

Headteachers, along with permanent and part-time teachers were all involved in delivering the new services and monitoring the progress of children. Ensuring stronger collaboration between full and part-time teachers has been key to delivering the project in a seamless fashion. Finding better ways to work together has, for example, provided scope to organise students into different groups according to their learning abilities. Plus, interventions have been integrated into the schools' yearly planning, which has helped to upgrade language and science teaching in general. The project is already assisting efforts to keep more children in school and is playing its part in improving educational attainment across the region. The rate of school drop-outs in Puglia has decreased from 30.3 % in 2004 to 19.5 % in 2011 (the national average is 17 %). The percentage of 15 year-old students with limited reading capacities was reduced to 16.7 % in 2012, which is below the national target of 20 %. Meanwhile, the number of 15 year-olds with higher reading skills has significantly improved in Puglia over the past few years, growing from 4.2 % in 2009 to 6.1 % in 2012.

Diritti a scuola's Help Desk, which was established to deliver counselling and information services, has proved to be hugely popular. More than 50 000 students (about 30 % of the student body in the project schools) and 10 000 families have used its services. In addition, numerous migrant students and their parents have profited from the Help Desk's services, particularly its cultural mediation, which is helping to tackle issues surrounding social exclusion and integration.

The project can also claim to have had a positive impact on the wider school system. It has contributed to improving teaching in general and strengthening relationships between teachers and children. In turn, providing struggling students with extra help to improve their basic skills has increased their motivation to learn, which is central to why so many have changed their attitudes to school attendance (*European Commission - Commission announces winners of the 2015 RegioStars 2015 awards – www. ec.europa.eu*).

In 2016 the Regio Star Awards for the smart growth category: Emerging opportunities in the global economy, was won by the Copenhagen Cleantech Cluster project, in the Danish capital where researchers, businesses and public bodies in Denmark develop a world-leading clean technology cluster of businesses for smart, sustainable innovation. "Cleantech" describes products or services that improve business performance or efficiency while reducing pollution, costs, inputs and waste. With the help of EUR 9 738 500 from the European Regional Development Fund, the Copenhagen Cleantech Cluster project created networks of companies and research institutes to spark ideas for new cleantech products and services and develop them into viable businesses.

Entrepreneurs also received direct support from the project in the form of business mentoring, opportunities to test and demonstrate products, and advice on international branding and marketing. And with the cluster providing a visible focus for the sector, businesses could more easily attract investment and top researchers. The project's overall vision was to develop a world leading cluster of cleantech researchers and businesses in Copenhagen and the country's Zealand region. Over 600 companies were included, active in many different service and manufacturing industries.

The project's 12 partners included leading Danish universities, a science park, business investors and organisations, and the Copenhagen foreign investment agency. Both regions also engaged in the project, which gave their smart specialisation strategies more impact and cut red tape for cross-border ventures.

As a result, many local cleantech companies grew their business, despite the financial crisis. Over 40% took on more employees, and over half increased turnover. Just under a third expanded exports. At the same time, new companies started up and international cleantech companies were attracted to set up business in the regions. Companies' close cooperation with each other and research institutes was particularly fruitful for innovation, shown by the high number of patents granted across the cluster. And the rest of the world took note. Recognised as one of the world's leading cleantech clusters by organisations such as the OECD and UNCTAD, the project hosted many international delegations and events.

In its five years, the cluster showed that sustainability is not just good for the environment. It created over 1000 new jobs, supported 126 start-ups, 64 research and company cooperations and 38 new cooperations between companies, and formalised cooperation with 15 leading clusters in the International Cleantech Network. At its end, CCC has merged with another Danish cluster – the Lean Energy Cluster – to create CLEAN, an organisation with over 170 members and even stronger business involvement (*European Commission - Commission announces winners of the 2016 RegioStars 2016 awards – www. ec.europa.eu*).

The Regio Star Awards for the year 2017 was won by the city of Li, Finland, where the co-creation between citizens and public administration has allowed to reduce CO2 emissions more quickly than any other municipality in the country from 2007 to 2015, according to the Finnish Environment Institute, SYKE. This achievement culminated in the EU-funded Innovative Low-Carbon Public Services project which was launched in 2015. The city of Ii in Finland cut its CO^2 emissions by half during 2007-15 - the fastest rate in the country. The InnoHiili project is helping the city reach the Finnish Environment Institute's target of an 80% emissions cut by 2030. But Ii plans to do it 10 years faster thanks to cooperation with all citizens. This project inspired the entire European community to continue working for sustainability during service co-design. The co-creation that is being brought to light in this project helps to share practices with a wider international audience and reinforces the belief that it is possible to innovate public services through citizen interaction. Citizens were asked for their ideas and input at the very beginning of the project with the help of the service design team. A municipality map was sent to every citizen so that they could mark their favourite place in the area on it, in-depth interviews were conducted with individuals, sometimes even in their own homes, and sessions were held with groups of young and elderly people to get their very different perspectives on how the municipality could be improved.

A strong emphasis was put on finding energy-efficient and eco-friendly solutions to the problems facing the citizens. Nearly half of the population commute to work, and traffic contributes to about 40 % of all the CO2 emissions in Ii, compared to an average of 28 % in Finland. Following on from an electronic survey, to which almost 500 people responded, the decision was made to build the first cycle path proposed by the citizens. All the public buildings of Ii are now heated with renewable energy, and electric cars take the municipality employees on business trips. A total of around EUR 600 000 is being saved each year. In addition, all schools and day-care centres are now participating in the Euronet 50/50 energy-saving programme. Digitalisation of the public services was a key feature of the project's campaign. Ii's Digital Agenda allows citizens to create their own public services. The municipality of Ii has about 10 000 inhabitants, which is similar to about 80 % of all municipalities in Finland. This means that the project is scalable and about 250 municipalities in Finland can adopt similar strategies in their own areas (*European Commission - Commission announces winners of the 2017 RegioStars 2017 awards – www. ec.europa.eu*).

In 2018 REGIOSTAR for the category il *public choice award* was awarded to "Alegre Heritage Museum". This project succeeded in stimulating tourism in the Portuguese municipality of Ílhavo by focusing on its porcelain production that dates back nearly 200 years. The wide-ranging reindustrialisation effort encompassing a slew of different sectors saved the Vista Alegre factory from ruin, maintained and created jobs and has put Portuguese municipality of Ílhavo on the map as a cultural destination.

Founded in 1824, Vista Alegre porcelain has been a focal point in Ílhavo for nearly 200 years and therefore an important part of the municipality's history. The "Vista Alegre Heritage Museum" project capitalised on this by building a winning strategy to promote responsible and sustainable tourism around the well-known brand. At the heart of the project – which integrates tourism, culture, community heritage and identity, as well as the art and porcelain industry – was the restoration and expansion of the Vista Alegre Museum. Its exhibition space has expanded from 365 m² to 6 531 m² following an overhaul that saw the inclusion of two invaluable porcelain ovens and several historical buildings. Since reopening after the renovation, the museum has seen a four-fold increase in the number of visitors and also offers popular workshops and artist internships.

Visitors can also tour the porcelain factory, as well as explore other surrounding attractions, that were also renovated or restored to their former glory as part of the project to make the area an international cultural centre focused on the area's industrial heritage. These include a theatre, chapel, workers' neighbourhood and a former palace that now harbours a hotel.

The museum's aim is to portray the heritage of Vista Alegre porcelain in a vivid and continuous manner that involves rotations of its collection, with the whole complex transformed into a place of discovery. The hotel's décor and architecture has made it one of the most attractive places to stay in the region. The 19th century theatre hosts plays quite often. he project has paid off for Ílhavo, following a scare in 2009 that almost saw porcelain production shut down. Had that happened, it would have been a major setback for the region – replete with a loss of jobs, as well as the disappearance of key community history and culture. In contrast, the project has seen significant regional impact, including the maintenance of 1 495 jobs and the creation of 100 new ones. Tourism is up, with overnight stays doubling. And the Vista Alegre factory has reported a 46 % jump in local store sales. Its international billing, meanwhile, saw a 25 % hike. The reindustrialisation effort endeavour has led to well-received educational and interactive initiatives. Porcelain workshops for schools and tourists attracted nearly 2 900 participants. And more than 120 artists have participated in the IDPool – Design Residence, a creative laboratory aimed at stimulating the exchange of ideas and experiences. Since 2017, Ílhavo also hosts an illustration festival based at the museum that offers a wide range of activities including performances and special exhibits. The project has also resulted in a wide array of partnerships, including with big name designers such as Christian Lacroix and Swedish furniture giant Ikea. (*European Commission - Commission announces winners of the 2018 RegioStars 2018 awards – www. ec.europa.eu*).

5. Discussion and implication

These examples from the REGIOSTAR Awards in 2014-2018 show that daily experiences, knowledge and skills of citizens can co-create value with public organizations, to enable them to achieve a common goal and improve territories, as also claimed in literature (Alves, 2013).

The difficulty of defining clear objectives for public sector innovations, aimed at generating individual value and social value, can be compensated through innovative models of public service delivery in combination with new approaches to problems that citizens, individually and collectively, are called to contribute and engage. The involvement of citizens has a positive effect on the organisation and supply of services. With the co-creation of value, the problems encountered by administrations in relation to the needs of citizens and the territory can be brilliantly overcome. The examples produced by the Regiostars awards in the period from 2014 to 2018 show how, by integrating citizens' resources into the public management process, organisations can solve problems related to the environment, social inclusion, employment, and the revitalisation of territories in different sectors (tourism, environment, social). However, the present research has a limit in the lack of the evaluation of citizens' perception, which will be the starting point for further research.

6. Conclusion

The examples given in the previous paragraphs helped to show that in order to create high-quality public services, it is necessary to take into account the point of view of the citizen in design and implementation processes. Although it may seem logical, this practice is not common: often the bodies that provide services are focused on compliance with the rules, procedures and internal organisation, all important aspects that cannot be the only drivers of the design. In this way, the citizen is a mere recipient of services, entirely designed and organized according to the logic and needs of the administration. This could easily lead to a failure in the provision of services and consequently to the lack of use and deriving benefits. The public sector clearly needs to develop a better understanding of this logic as well as its specific role in the co-creation of value, promoting the active involvement of citizens.

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A Consideration on Interorganizational Learning and R&D Capability

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Abstract: This study illustrates how Toyota, one of the world's largest automobile companies, has emerged as a leading R&D company in rechargeable battery business in Japan. Since 2010, Toyota has applied for the most number of patents of rechargeable battery. The study examines the period, that is, the 1990s and the 2000s, during which Toyota accumulated R&D capability in rechargeable battery technology. Several automobile companies, such as Toyota and Nissan, have engaged in research on a rechargeable battery system adaptable to electronic vehicles. Compared to Nissan, Toyota collaborated with several external partners. A time series analysis of patent data comprising 631 samples spanning 1998 to 2003 shows that Toyota accumulated R&D capability over time, absorbing technical expertise from partners, thus evolving as a leader of R&D in rechargeable battery technology. Patent citation data (N = 353) from 2006 to 2009 traced these patents back to the technologies of Toyota's former partner Panasonic. Thus, the study results confirm that Toyota had gained technological expertise from partners and eventually forayed into internal R&D of rechargeable battery. Earlier theoretical studies on open innovation have focused on only collaboration and partnership for technological outputs. This study concentrates on the interorganizational learning via open innovation. While open innovation for technological outputs is considered as a direct outcome, open innovation for interorganizational learning broadens the theory on an indirect outcome for R&D capability as well as a direct outcome. This study proves that the effects of interorganizational learning are visible over time. From both theoretical and practical perspectives, a company must exploit open innovation for long-term collaboration as takes a few years for the partnership on R&D activity to take effect. By cross-correlating lagged patent data for Toyota and Nissan, this study documented, first, that open innovation through horizontal and vertical partnerships generates learning effects. Second, those learning effects are delayed, significant, and persistent. Third, our findings counter the claims of adverse impacts from organizational learning. Previous studies ignored time lags for learning from vertical and horizontal partnerships. Finally, this study documented the importance of core partners and long-term collaboration.

Keywords: open innovation, interorganizational learning, partnership, delayed effect, R&D capability

1. Introduction

Japanese automakers Toyota and Nissan began to research rechargeable batteries in the early 1990s in anticipation of producing electric vehicles (EV). Rechargeable batteries were new for them, and both companies struggled to become self-sufficient researchers. Although Toyota and Nissan were almost the same level until the early 2000s, Toyota started to surpass Nissan from the late 2000s. This is because Toyota took advantage of open innovation (Chesbrough, 2003) more than Nissan did.

Chesbrough (2003) introduced the concept of open innovation, in which companies make the most of external knowledge as well as internal knowledge. In this case, Chesbrough (2003) defined knowledge as technologies and ideas. In order to promote open innovation, partnership is the most important measure, i.e.. alliance (Gerlach, 1992; Nooteboom, 1999) and cooperation (Gomes-Causseres, 1996; Powell et al. 1996; Dyer, 1996) with partners. Although management style and R&D governance for open innovation have attracted attention so far (e.g., Chesbrough and Appleyard, 2007; Dyer, 1996; Bergman et al. 2009), this paper focuses on output variable. Previous researches paid attention to the technological outputs (i.e. innovation, products, or patents) as an output variable (Laursen and Salter, 2006; Chesbrough, 2006), but this paper did to interorganizational learning effects (see 2.2). Indeed the direct output of open innovation is an innovative product, but indirect output such as interorganizational learning effect is also important. Interorganizational learning generates R&D capability and dynamic capability (Teece et al., 1997). Then companies with R&D capability are able to research and develop innovative technologies by themselves.

However, among open innovation theories, the paradox of openness has been discussed for many years (Laursen and Salter, 2014; Arora et al., 2016). Too much openness sometimes erodes company's performance and company's capability (Laursen and Salter, 2014; Enkel et al., 2009). There seems to be a tradeoff between openness and appropriability in the process of open innovation. Toyota made the most of partnership and reached a top R&D company of rechargeable battery. This case is apparently a counterexample to previous researches, however, from the view point of interorganizational learning, it turns out that Toyota learned technological-base knowledge from partner, improved R&D capability, and then was able to research by own capability. While Nissan, which never promoted open innovation aggressively, slowed down R&D on

rechargeable battery in the late 2000s, Toyota aggressively formed partnership with various companies and at that time Toyota embarked on research on its own.

This paper reveals some facts on Toyota's outstanding partnership management. Toyota formed vertical and horizontal partnership on cooperation of R&D, although previous theories pointed out that vertical and horizontal partnership at the same time should be less effective (e.g., Stefan and Bengtsson, 2017; Haus-Reve et al., 2019). That is a second counterexample to the previous theories. This paper employs time series analysis and reveals the reason why Toyota succeeded R&D via partnership.

2. Theoretical background

2.1 The concept of open innovation

Large manufacturers have been devoted to in-house R&D and disparage external R&D as Not-Invented-Here, which is a strong bias against technology from the outside (Katz and Allen, 1982). Chesbrough (2003) proposed to combine internal and external knowledge as open innovation. Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology (Chesbrough, 2003). Under the open innovation paradigm, partnership is the important strategical measure (Lee et al., 2010). In the process of open innovation, companies often confront with some managerial problems. At first, company must search adequate partners, and prepare to converge both R&D activities of own company and partner (Laursen and Salter, 2006; Enkel et al., 2009). Then at the next stage, the company must combine internal and external knowledge (Enkel et al., 2009; Van de Vrande et al., 2009; West and Bogers, 2014). Finally, the company must develop innovative products (West and Bogers, 2014).

In the searching process, the importance of intermediary market (Chesbrough, 2006) and the role of innovation community (Ficher, 2009) have been introduced by previous researches. However, the governance of partnership is left as unsolved problem. Felin and Zenger (2014) discussed the choice of governance form - open or closed - should be driven by innovation problem type. In this context, innovation problem is concerning communication channels, incentives, property rights and so on. Therefore open innovation doesn't always work well. Then, as a boundary condition of effectiveness on open innovation, how to manage partnership is also an important matter. Laursen and Salter (2014) reveal curvilinear relationship between open innovation and performance. Dahlander and Gann (2010) too much openness incurs costs. So too much openness hurts company's performance.

However, at one stage, the company have to form partnership in spite of the paradox of openness, at other stage it must handle R&D independently via internal R&D. Thus, it is certain that there is no contradiction between these two governance modes (Maegawa and Miyamoto, 2009). This is why this paper takes a position that they are not a trade-off relation. The most important thing is how to demonstrate that process and stages with the management of partnership and of internal R&D. Therefore this paper employs time series analysis.

2.2 R&D capability and interorganizational learning

Teece et al. (1997) defined dynamic capability as exploiting existing internal and external company specific competences to address changing environments, company's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments. And by referring Teece et al. (1997), Zollo and Winter (2002) discussed dynamic capabilities, defined as routinized activities directed to the development and adaptation of operating routines. They emphasize accumulating experience, articulating knowledge, and codifying knowledge in the evolution of operational routines. The argument is made that dynamic capabilities are shaped by the coevolution of these learning mechanisms. Especially relation of R&D capability and performance is measured based on the criterion of Patents (Coombs and Bierly, 2006; DeCarolis and Deeds, 1999). Therefore this paper analyzes R&D capability by using patent data.

Managing R&D capability—accumulating it internally (Helfat, 1997; Kim, 1999) and obtaining it externally (West and Bogers, 2014)—is crucial. In addition to internal accumulation and external transfer, interorganizational learning has been considered (Figueiredo, 2002). Inkpen (1996) discussed the collaboration and partnership from the view point of alliance learning and interorganizational learning. However the management of learning process is also important. Indeed bridging distant or diverse knowledge should enhance creativity (Audia and

Goncalo, 2007) hence broader recombination with various partners leads to economic values (Kaplan and Vakili, 2015). But there is a significant negative interaction between science and supply-chain collaboration (Haus-Reve et al., 2019). Thus seeking partnership with horizontal (rivals and basic research) and vertical (suppliers and users) at the same time decrease company's performance with open innovation. Vertical collaboration itself has a positive impact on innovation performance (Tomlinson, 2010). The other researches pointed out that horizontal collaboration enhanced novelty, while vertical collaboration enhanced effectiveness (Stefan and Bengtsson, 2017). Seeking both has negative impact, and which is better depends on innovation process (Jensen et al., 2007). However the case of Toyota is a counter example because Toyota forms partnership with horizontal and vertical partner at the same time.

Patent applications confirm the status of partnerships by naming co-applicants. This study obtains information on partnerships and interorganizational learning from patent data. It uses lagged time-series data to compare results of Toyota's and Nissan's approaches to open innovation.

2.3 Research question

Noting that earlier studies do not consider whether learning through open innovation might entail time lags, this paper formulated three hypotheses.

> *Hypothesis (1): Open innovation exerts delayed and long-term effects on interorganizational learning.*

> *Hypothesis (2): Time-lags for horizontal and vertical partnerships differ. With time lags considered, simultaneous horizontal and vertical partnerships enhance open innovation.*

> *Hypothesis (3): Horizontal and vertical partnerships increase a company's internal R&D capability and performance.*

3. Analysis

3.1 Toyota and Nissan

During the mid-1990s, Nissan sought more patents than Toyota. Toyota began to pursue open innovation around 1997, and from 1998 to 2003, it had a core partnership with Panasonic, a follower in the rechargeable (lithium-ion) battery business. Nissan collaborated only intermittently with Sony, a leader in rechargeable battery technology, and had no core partner. In addition, Toyota formed longer-term partnerships than Nissan. Figure 1 compares trends in patent applications concerning rechargeable batteries for Toyota and Nissan.
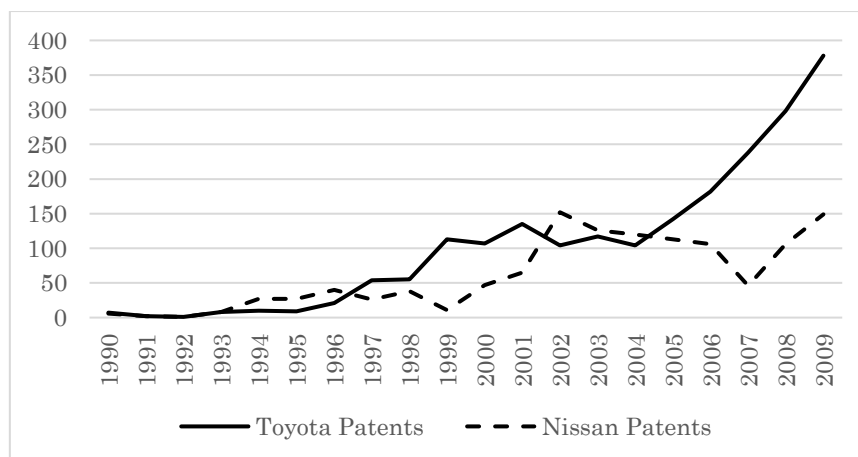
Figure 1: Number of patent applications for Toyota and Nissan

Toyota surpassed Nissan in applications from 1997 to 2001 (Figure 1), but the number of patents as a head applicant (a head inventor) shows Toyota and Nissan were the almost same level (Figure 2). Until about 2004, Toyota and Nissan applied for about the same number of patents related to rechargeable batteries. Toyota has far surpassed Nissan since 2005 after entering a core partnership.
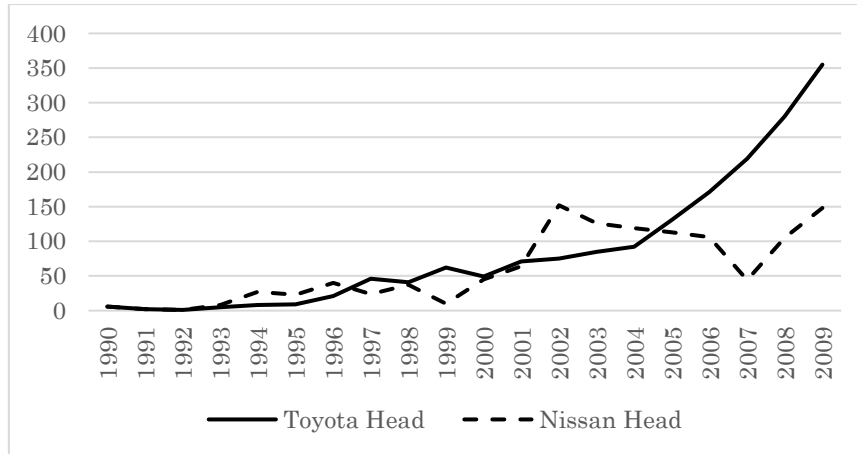
Figure 2: Number of patents as a head applicant

Figure 3 shows the details on patent partners of Toyota and Nissan when both companies were in a close level. Toyota sought 45.3% of its patents in conjunction with partners and Nissan 2.7%. Almost 30% of Toyota's applications involved a core partner.

<Toyota> Patents: 1998-2003		Patents with partners		Patents with a core partner	
631	（%）	286	（45.3）	179	（28.4）
<Nissan> Patents: 1998-2003		Patents with partners		Patents with a core partner	
439	（%）	12	（2.7）	0	（0.0）

Figure 3: Ratio of Patents with Partners

Before 2005 indeed Toyota applied many patents every year, but almost half of patents were outputs with partners. As Toyota applied far more patents as a head applicant rapidly since 2005 (see Figure. 2), Toyota was able to initiate researching the rechargeable battery by own R&D capability since then. It is confirmed that Toyota was intent on open innovation, then supposed that improved interorganizational learning in the meantime (1998-2003). At the next section, this paper observes and verifies the learning effect from partners.

3.2 Time-Series analysis (1): Partial autocorrelation function

By employing time series patent data of Japanese patent office website (J-Plat Pat), this paper calculates partial autocorrelation function (PACF or Partial ACF), partial correlation between an observation in a time series with observations at prior time steps at all shorter lags. Figure 4 shows partial correlations with all lags of Toyota's patents in time series. Partial correlation function of one-year lag is the highest (PACF: 0.743). This means Toyota improved R&D capability every year steadily. R&D capability of one-year ago enhances R&D capability of next year, thus R&D capability of Toyota was being accumulated every year. The reason of this will be studied at 3.3.
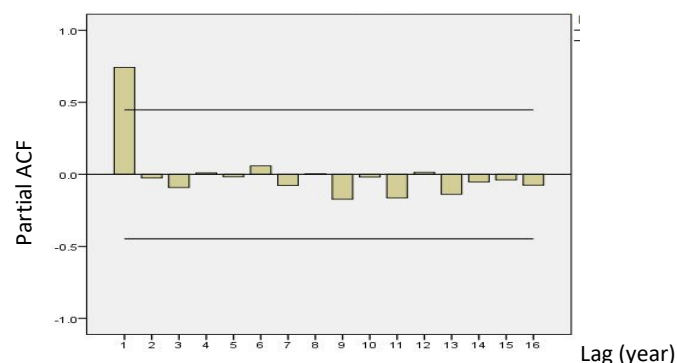
Figure 4: Partial Autocorrelation of Patents by Toyota

3.3 Time-Series analysis (2): Cross correlation function

Figure 5 explains cross correlation, a measure of similarity of two time series with lag considered. And Cross correlation function shows delayed effects. In this paper, displacement term is set by five year.

The first row shows cross-correlated time series for all patents and patents submitted with partners. Results indicate the effects of interorganizational learning were delayed but persistent. The second row shows cross-correlated time series for all patents and patents submitted with suppliers (vertical collaboration). Interorganizational learning effect from supplier lasts short. And figures of 4 years later are very small. So this effect of suppliers last less than 4 years. The third row shows cross-correlated time series for all patents and patents submitted with a core partner (horizontal collaboration). The greatest effects of interorganizational learning appear after four years and decline at eight years. Note that the effect at four years is greater than at two years.

Type of collaboration	2 years later	4 years later	6 years later	8 years later
Patents * All collaboration	.949	.761	.513	.233
Patents * with Supplier	.480	.064	-	-
Patents * with Core Partner	.739	.763	.442	.068

Figure 5: Cross-Correlation by Type of Collaboration

4. Discussion

Since 2005, Toyota has sought more patents for rechargeable batteries than Nissan and now holds the most for that technology. The explanation is that Toyota formed partnerships aggressively, especially with core partners. Toyota promoted internal R&D after partnerships expired, and the number of applications leaps after 2005. However in accord with absorptive capacity (Cohen and Levinthal, 1990), this research focuses that Toyota had researched rechargeable battery to some extent before starting partnership. This experience and trial-and-error bring knowledge base of absorptive capacity with Toyota (Lane and Lubatkin, 1998; Helfat, 1997). Then Toyota acquired interorganizational learning effect from partners.

From Figure 4, delayed effect of interorganizational learning is verified. In addition, the effect term between suppliers (vertical) and a core partner (horizontal) is different; the one of suppliers is short, while the one of a core partner is longer. Thus, by focusing effect term, this finding can solve the trade-off problem that previous researches pointed out. As a governance of partnership, it was crucial whether Toyota kept friendly and long term or not. As long term interorganizational learning brought about huge learning effect. Moreover as learning effect is a delayed effect, Toyota kept partnership and improve own R&D capability for a long term patiently.

From 2005, Toyota researched rechargeable battery by utilizing own R&D capability, which had been brought about via interorganizational learning through partners. The evidence of this is as below (Figure 6). The term in which Toyota increased patents is from 2006 to 2009. This paper extracts high value patents out of all patents that Toyota applied, in the criteria of registration by patent office and citation by other companies. For extracted patents, this paper analyzes each patent about forward citation, from which the knowledge source of each patents can be confirmed. From Figure 6 of citation data (knowledge source), Toyota acquired knowledge from a previous core partner Panasonic (a follower company), even compared to a leader company (Sanyo). Thus, in this term, R&D capability to initiate internal R&D and reach a top R&D company came from the previous experience of long-term collaboration with a core partner so much.

High Value Patents (cited by others and registered)		Core partner (Follower); Panasonic		Non-Core partner (Leader); Sanyo	
353	(%)	97	(27.5)	65	(18.4)

Figure 6: Details of high value patents by partners

In summary, the findings of this paper can be illustrated at Figure 7. At first Toyota by itself researched to accumulate absorptive capacity. Then, Toyota embarked partnership mainly with a core partner to promote interorganizational learning, as Toyota wasn't familiar with rechargeable battery of new battery (lithium-ion battery). Finally, Toyota initiated internal R&D as a top R&D company in the rechargeable battery.
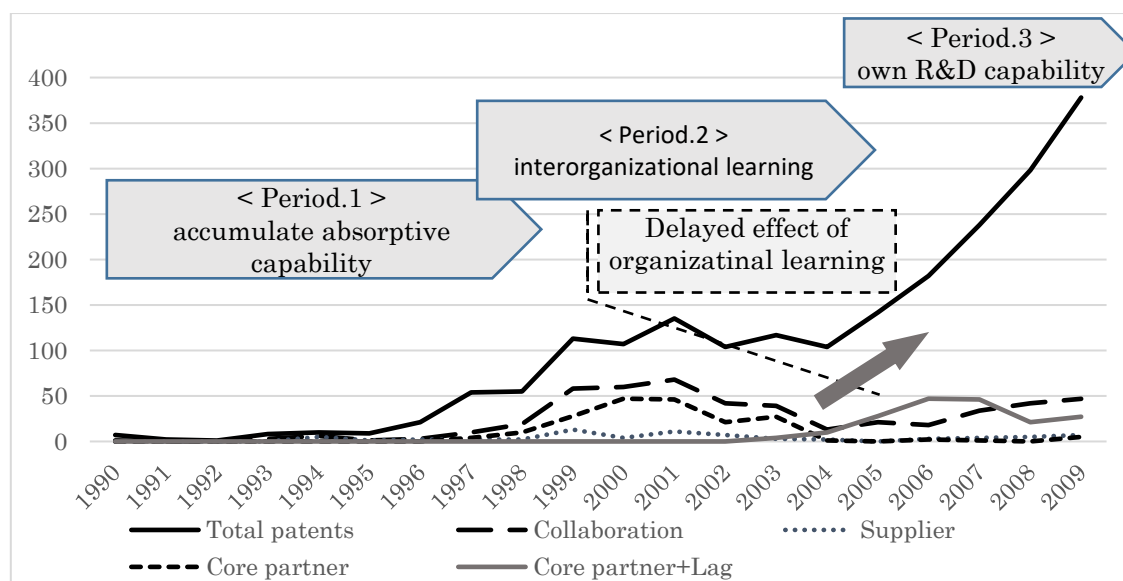
Figure 7: Summary of findings

5. Conclusion

By cross-correlating lagged patent data for Toyota and Nissan, this study documented, first, that open innovation via horizontal and vertical partnerships generates learning effects. Second, those learning effects are delayed, significant, and persistent. Third, our findings counter claims of adverse impacts from organizational learning. Previous studies ignored time lags for learning from vertical and horizontal partnerships. Therefore, Hypotheses 1 and 2 are supported. Fourth, this study documented the importance of core partners and long-term collaboration. Toyota's core partner (Panasonic) was familiar with rechargeable battery, and Toyota, which had built sufficient absorptive capacity, benefitted from that long-term partnership several years later. From the data on patents as a head applicant (Figure 2), Toyota has increased patents as a head applicant rapidly since 2005, before then partnership between Toyota and Panasonic had expired. This is because Toyota was accumulating R&D capability steadily (Figure 4), at around 2005 Toyota had enough capability to embark internal R&D, and this huge capability leads Toyota to reach a top R&D company. Therefore, hypothesis 3 is supported.

As Toyota is an automobile company, Toyota was not familiar with rechargeable battery technology in the 1990s. Actually, from the 1990s to the middle of the 2000s, Toyota and Nissan were at the same level on rechargeable battery. However, in this term, Toyota was proactive to open innovation as interorganizational learning, although Nissan wasn't so. This management on open innovation gave rise to significant difference between these two automobile companies.

Practical implication of this paper is that term of partnership is an important matter on management of open innovation, and then, company which plans to advance a new technological area should wait for delayed effect of interorganizational learning. Moreover originality of this paper is describing the process from pre-partnership to post-partnership via attesting the delayed effect. As the fact, Toyota was proactive to open innovation, although Nissan wasn't so. This management on open innovation gave rise to significant difference between these two automobile companies. The originality of this paper is considering open innovation as interorganizational learning process, and its effect as a delayed effect.

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The Role of Intellectual Capital in Mitigating Inflation-Related tax Distortions

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Abstract: A higher corporate tax burden (TB, CTB) in the presence of inflation have long been viewed as an interesting topic of many researchers as well as practitioners. Hence, firms make constant efforts to mitigate this distortion by investing intellectual capital (IC) because these assets allow them to ignore "the matching concept" in accounting standards. This paper investigates the role of IC as well as intellectual property rights (IPR) reform in mitigating inflation-related tax distortions, using a panel dataset extracted from non-financial listed firms in Vietnam during the period from 2011 to 2018. Adopting the fixed- and random-effect regressions to analyse a sample of 932 firm-year observations, the study finds that inflation distorts the real CTB when tax deductions are based on historical cost. More importantly, these distortions, however, are mitigated by investing in IC as well as reforming IPR at firm and country level, respectively. The findings are valuable at both theoretical and practical significances. For theoretical contribution, this research provides empirical evidences to current literature because it is one of the first papers focusing on the role of IC in mitigating tax distortions in Vietnam. In addition, compared to existing studies, we apply the valuation theory to measure CTB instead of finance theory. For practical contribution, companies can make decisions related to invest in IC.

Keywords: Intellectual capital, IPR reform, inflation, tax burden, tax distortions

1. Introduction

The negative association between CTB and firm value is really consistent and companies usually try to minimize their CTB with the support of consulting firms (see Anesa et al., 2018; Dowling, 2014; Sikka, 2010). This minimization idea is essentially considered as legitimate (Brown, 2011) basically because reducing annual expenses to make companies become more valuable is normal and natural actions of directors (see Hanlon and Heitzman, 2010), even by critical researchers (Beloe *et al.*, 2006). However, TB can be recorded lower (or higher) in inflation (or deflation) environment because of adopting accounting standards. In other words, the presence of inflation makes components of assessable income (including both income and expense) distorted (Gonedes, 1981; Dhaliwal *et al.*, 2015; Zurita, Castillo and Niño, 2018). Depreciation, which is appeared by "the matching concept" in accounting standards, is an example. Depreciating assets does not consider the inflation-adjusted index for years later and that therefore leads to reflect less expense as well as the higher CTB. This leads to business valuation models, in recent years, have begun to reveal many limitations with inconsistent results (Zurita, Castillo and Niño, 2018).

Across the various empirical studies of testing the impact of inflation on tax distortion, the evidence is still mixed (Anderson et al., 1983; Bernard and Hayn, 1986; Dhaliwal et al., 2015; Ferris and Makhija, 1988; Finocchiaro et al., 2018; Kaul, 1987). The literature focuses mostly on the impact of inflation on CTB or the value of tax shield under U.S. tax rule as well as the offsetting problem between deductibility of capital expenditure (i.e., depreciation) and nominal interest expense. In contrast, our study is part of an emerging literature that seeks evidence to support associations and councils to adjust existing valuation models in the future. More importantly, I argue that investing IC can mitigate CTB because they do not follow "the matching concept". Governments, however, need to pay attention to reform IPR so that enterprises have more motivation to innovate.

We develop our hypotheses based on the argument of Dhaliwal et al. (2015), Zurita et al. (2018), and Finocchiaro et al. (2018) with some adjustments. First, we analyze the tax distortion for Vietnam where often witness the economies that experience inflation. Besides, the report "Vietnam 2035: Toward Prosperity, Creativity, Equity, and Democracy, that is published by Worldbank and Ministry of Planning and Investment of Vietnam, shows that innovation is a main considered factor for motivating of economic growth. Second, previous articles apply variables based on cash flow and/or tax avoidance as proxy measures for CTB or tax distortion. They believe that cash flow will reflect inflation in current year and we also support this argument. The interested problem, however, is that whether firms face a higher CTB when countries experience inflation. This means that the CTB

recorded in the income report is higher than that they need to pay and it is only a liability without cash outflow. Hence, we follow tax distortion based on business valuation theory and this also help to meet "the matching concept" and "the accrual concept" in accounting field. Finally and most importantly, this paper also analyze the impact of IC on CTB as well as the role of IC and IPR reform in inflation-CTB relation.

The remainder of this paper is structured as follows. In Section 2, we review the existing literature on inflation-tax relationship. Section 3 describes the data, sample and empirical models. Section 4 presents the empirical results. Section 5 concludes the paper.

2. Relevant literature and testable hypotheses

Numerous prior empirical studies (e.g., Auerbach, 1983; Feldstein, 1980a, 1980b; Gravelle, 1994; Steuerle, 1985) show that estimating taxes based on nominal income increases CTB when existing inflation, especially for inventory- and capital-intensive enterprises. This distortion comes from the presence of inflation that decreases the value of tax deductions because these accounts are estimated by historical cost instead of present value (Dhaliwal *et al.*, 2015). The positive association between inflation and CTB is called as the "tax hypothesis" (see Dhaliwal et al., 2015).

In the light of previous ideas, there is a clear impact of inflation on CTB; however, whether the existence of inflation distorts CTB that has been a complex problem and lack of consistent results. Some prior researches support the idea that businesses record a higher CTB in a economy existing inflation (e.g., Anderson et al., 1983; Ferris and Makhija, 1988). Deducting nominal interest before calculating taxable income is able to decrease CTB and this benefit is large enough to offset the tax distortion because of accounting methods based on historical information, howerver (Modigliani and Cohn, 1979). This argument is supported by later findings (e.g.,(Geske and Roll, 1983; Gonedes, 1981; Kaul, 1987). This opinion is challenged by another arguments showing that this gain only offsets the increase in interest expense by the change of nominal interest rate instead of the whole consequences (Maher and Nantell, 1983). On the other hand, there is a mixed evidence related to tax hypothesis suggested by the study of Bernard and Hayn (1986). The latest paper of Dhaliwal et al. (2015) supports the argument of Maher and Nantell (1983) when finding that leverage is not related to the tax hypothesis. Vietnam has been a country focusing on physical capital and thus the ratio of the fixed assets to total assets recored into Vietnam firms' financial statements has been much higher.

Previous studies find that IC plays the key role to push financial performance (e.g., Sardo et al., 2018). More importantly, many items of IC are unable to recorded into financial statements by the rule of accounting standards and thus, they do not to meet "the matching concept" and "the accrual concept". As a result, it is expected that the presence of IC can mitigate CTB, expecially in the knowledge-based global economy. However, paying attention to invest IC depends on reforming IPR in each country and this is a major problem for developing nations where IPR are less protected (see Alimov, 2019). Hence, I also expect that IC and IPR reform play a crucial role in mitigating the tax distortions. This study extends the research of Dhaliwal et al. (2015) by testing how IC and IPR reform affect the association between inflation and CTB. Therefore, I formulate the following hypotheses:

- H1. Tax distortion will be larger when countries experience inflation.
- H2. Tax distortion will be smaller when firms focus on IC.
- H3. The relationship between inflation and tax will be impacted when firms invest IC and countries reform IPR.

3. Methodology

3.1 Data

The data in this study come from Thomson Reuters database, which is a database of comparable financial and business information on firms of many countries in the world. I focus on all non-financial companies that were listed on the Stock Exchange of Vietnam (including Hanoi Stock Exchange and Ho Chi Minh Stock Exchange). The sample period is 2011-2018, and it starts (and ends) three years before (and after) Vietnam's IPR reform in 2015, respectively. 2015 is considered as the turning point because of a long-term commitment of Vietnam government on reforming administrative procedure and property rights to support start-up community. Besides, in 2015, Prime Minister of Vietnam also determines that innovative knowledge, creativity, advanced science and

technology are main factors to improve the quality of economic growth. I exclude financial institutions (including insurance firms, diversified financial firms, banks) and utility firms, respectively from the sample because of the difference in capital structure (Fama and French, 1992) as well as in presenting financial statements (Basil and Khaled, 2011). Continuously, I also delete observations with missing Thomson Reuters data, I am left with a sample of 932 firm-year observations. In this paper, there are a large of deleted observations because of missing human capital data. Table 1 describes the sample selection in our analysis.

Table 1: Sample selection

	Thomson Reuter Database			Sample	
	Number	Percent (%)		Number	Percent (%)
Consumer Discretionary	1240	9.42		98	10.52
Consumer Staples	1435	10.90		133	14.27
Energy	680	5.16		50	5.36
Health Care	418	3.17		44	4.72
Industrials	4872	36.99		299	32.08
Materials	2552	19.38		170	18.24
Real Estate	1297	9.85		122	13.09
Other	676	5.13		16	1.72
Total	13170	100		932	100

3.2 Empirical models

Our study uses a panel dataset for Vietnam, where the inflation rate seems to be difficult to predict as well as higher than other nations because of a trade-off of economic growth. On the other hand (and most importantly), our paper defines and measures variables according to business valuation theory instead of accounting and corporate finance theory as previous empirical studies. In initial analyses, our paper examines the influence of inflation rate on CTB as well as the impact of IC and IPR reform on this relation by using conventional regression analyses for panel data (i.e., Fixed Effect Model, FE; and Random Effect Model, RE). Following the study of Dhaliwal et al. (2015), empirical models in this study shown as follows:

$$CTB_{i,t} = \beta_0 + \beta_1 INF_t + \sum \beta_m \text{Controls} + \varepsilon_{it} \qquad (1)$$
$$CTB_{i,t} = \beta_0 + \beta_1 INF_t + \sum \beta_n IC_t + \sum \beta_m \text{Controls} + \varepsilon_{it} \qquad (2)$$

where the subscript i identifies the firm; the subscript t indicates the period, and ε_{it} represents the term for random disturbance. Model (1) and model (2) are applied to test hypothesis 1 and hypothesis 2. CTB is measured by both conventional variable (based on cash paid, CTB_CASH) as well as proxy measure based on valuation theory (tax distortions, CTB_DIST). To test hypothesis 3, I then split the sample into four groups to isolate the effects of IC and IPR reform. I split the sample according to IC (above or below the median level of VAIC) and the years before and after the year of actual IPR reform. Next, I re-estimate the FE and RE regression model for each of the four sub-samples. Table 2 summarizes the definitions of variables in this study. Besides, there are various methods developed to measure IC in textbooks as well as previous empirical studies such as Skandia IC Report Method, SICRM, (Edvinsson and Malone, 1997), Value Added Intellectual Coefficient, VAIC[TM], (Pulic, 1998, 2000), Intangible Asset Monitor Approach, IAMA, (Sveiby, 1997). The Pulic's VAIC[TM] model, however, has been still adopted by both academics as well as practitioners (Nimtrakoon, 2015) because of many advantages. To be more specific, the Pulic's VAIC[TM] model seems to be simple to use and data is also feasible because it is available in the financial statements (Nimtrakoon, 2015). Besides, the results of this model are also verifiable when comparing to the others (Young *et al.*, 2009). On the related line, this paper employs the VAIC[TM] measure, shown below as Eq. (3) to Eq. (8) as a proxy for IC:

$$VAIC = ICE + CEE = HCE + SCE + CEE \qquad (3)$$
$$ICE = HCE + SCE \qquad (4)$$
$$HCE = VA/HC \qquad (5)$$
$$SCE = SC/VA \qquad (6)$$
$$CEE = VA/CE \qquad (7)$$
$$VA = OUT - IN \qquad (8)$$

where VAIC includes three components of HCE, SCE, and CEE with the sum of HCE and SCE as IC Efficiency, ICE. VA is the difference between total income (OUT) and total expenses excluding employee costs (IN). HCE is

Human Capital Efficiency with HC as the Human Capital, measured by the total employee expenditures. SCE is Structural Capital Efficiency with SC as the Structural Capital, measured by VA-HC. CEE is Capital Employed Efficiency with CE as the Capital Employed both physical and financial assets, measured by total assets – intangible-fixed assets.

Table 2: Description of variables

Concept	Variable	Definition	Authors
Corporate tax burden	CTB_CASH	Ratio of cash paid for taxes to pre-tax operating cash flows	Dhaliwal et al. (2015)
	CTB_DIST	Natural logarithm of the difference between nominal CTB and CTB	See Damodaran (2012); Koller et al. (2015); Pinto et al. (2015); Pratt and Niculita (2008); Trugman (2017)
Inflation	INF	The change in the CPI from fiscal year-end *t-1* to fiscal year-end *t*	Alagidede and Panagiotidis (2010); Dhaliwal et al. (2015); Rödel (2014)
Financial leverage	LEV	Ratio of long-term debt to total assets	Dhaliwal et al. (2015); Connelly et al. (2012)
Intellectual capital	HCE	Ratio of VA to HC	Pulic (1998, 2000)
	SCE	Ratio of SC to VA	Pulic (1998, 2000)
	VAIC	The sum of ICE and CEE	Pulic (1998, 2000)
PP&E	PPE	The ratio of net PP&E to total assets.	Dhaliwal et al. (2015)
IPR Reform	REFORM	Coded 1 if the year of observation is in or after 2015; 0 otherwise.	See Alimov (2019)
Controls	SIZE	Natural logarithm of book value of total assets	Bunkanwanicha et al. (2016); Connelly et al. (2012); Dyreng et al. (2017)
	AGE	Natural logarithm of number of years after foundation	Connelly et al. (2012)
	ROA	Ratio of the adjusted earnings before interest after taxes to total adjusted assets	Damodaran (2012)

4. Main results

The descriptive statistics for the sample are depicted in Table 3. The sample is split by VAIC (low and high VAIC) and IPR reform (before and after IPR reform), where low VAICs are observations where the value of VAIC is less than 4.57 (sample median) and it is set to high if the value of VAIC is 4.57 or more. In the sample period (2011-2018), 2015 is considered as Vietnam's IPR reform year; hence, it is set to before IPR reform if the year of observation is before 2015, and after IPR reform otherwise. Table 3 shows five sets of statistics: (i) for the full sample of 932 observations, (ii) for 466 observations with low VAIC, (iii) 466 observations with high VAIC, (iv) for 389 observations that is before the year of actual IPR reform, and (v) for 543 observations that is on and after the year of actual IPR reform.

Table 4 contains a correlation matrix for all variables used in this paper. Correlations that are statistically significant at the 10 percent level are shown in bold. The correlation between CTB_CASH and almost independent variables is statistically significant other than PPE and AGE while there are many independent variables that is statistically significant with CTB_DIST.

Table 3: Summary statistics

	All firms			VAIC					REFORM				
				< 50th percentile			> 50th percentile		< 50th percentile			> 50th percentile	
	Mean (1)	Std. Dev. (2)		Mean (3)	Std. Dev. (4)		Mean (5)	Std. Dev. (6)		Mean (7)	Std. Dev. (8)		Mean (9)	Std. Dev. (10)
CTB_CASH	0.563	2.472		0.561	2.384		0.566	2.560		0.487	2.637		0.618	2.348
CTB_DIST	18.975	1.842		18.780	1.762		19.170	1.900		18.524	1.837		19.298	1.777
INF	3.887	2.301		4.241	2.564		3.534	1.945		4.504	3.469		3.445	0.131
HCE	6.957	13.384		2.352	0.729		11.563	17.766		6.905	14.437		6.995	12.590

	All firms			VAIC					REFORM			
				< 50th percentile			> 50th percentile		< 50th percentile		> 50th percentile	
SCE	0.690	0.208		0.526	0.167		0.854	0.068	0.666	0.206	0.707	0.207
VAIC	7.787	13.475		3.010	0.897		12.564	17.805	7.714	14.531	7.840	12.679
LEV	2.499	1.458		2.665	1.651		2.334	1.216	2.547	1.567	2.465	1.376
PPE	0.233	0.196		0.227	0.198		0.238	0.194	0.244	0.195	0.227	0.197
REFORM	0.582	0.493		0.506	0.500		0.658	0.474	0	0	1	0
AGE	2.819	0.496		2.908	0.515		2.730	0.461	2.716	0.436	2.893	0.523
SIZE	28.093	1.477		27.721	1.365		28.465	1.492	27.603	1.428	28.444	1.411
ROA	0.102	0.143		0.074	0.062		0.131	0.188	0.108	0.176	0.098	0.113
N	932			466			466		389		543	

Table 4: Pairwise correlation

	1	2	3	4	5	6	7	8	9	10	11	12
CTB_CASH	1.000											
CTB_DIST	0.004	1.000										
INF	0.007	**0.163**	1.000									
HCE	0.044	-0.016	-0.027	1.000								
SCE	0.036	**0.144**	**-0.148**	**0.414**	1.000							
VAIC	0.044	-0.013	-0.029	**0.999**	**0.428**	1.000						
LEV	-0.024	**0.067**	-0.022	-0.052	**-0.114**	**-0.057**	1.000					
PPE	**-0.062**	**0.446**	-0.008	-0.039	0.012	-0.039	**-0.101**	1.000				
REFORM	0.026	**0.207**	**-0.227**	0.003	**0.098**	0.004	-0.027	-0.041	1.000			
AGE	**0.169**	0.001	**-0.077**	**-0.168**	**-0.164**	**-0.169**	-0.058	0.001	**0.176**	1.000		
SIZE	-0.004	**0.639**	**-0.235**	**0.133**	**0.294**	**0.135**	**0.286**	0.037	**0.281**	-0.067	1.000	
ROA	-0.027	**0.057**	**0.067**	**0.082**	**0.249**	**0.092**	**-0.237**	0.018	-0.033	**-0.088**	**-0.129**	1.000

Table 5 presents regression results using CTB as the dependent variable. The dependent variable CTB in Panel A is calculated based on the conventional approach, cash paid for taxes divided by pre-tax operating cash flows (see columns 1-5). By contrast, Panel B shows the regression results with dependent variable CTB based on tax distortion, measured by the difference between nominal CTB and CTB (see columns 6-10). In this table, I run FE and RE regressions using all firms in the sample to test H1 and H2. In Panel A, the coefficients for inflation is not statistically significant at conventional level for all of five models. This indicates that after controlling for other factors, there is no significant relation between inflation and CTB, consistent with above mentions related to proxy measures for CTB. Besides, there are significantly positive associations between IC (including HCE, interaction between HCE and SCE, and VAIC) and CTB but these relations are as unexpected. However, looking at the results from Panel B, which presents the CTB based on valuation theory, a striking finding is that inflation is positive and statistically significant with CTB for all models (see columns 6-10). This result support the "tax hypothesis" and consistent with the research of Dhaliwal et al. (2015). More importantly, the findings also provide preliminary support for my contention that investing IC is able to reduce CTB when the presence of IC is negavtive and statistically significant (see columns 7-9). The coefficient for interaction between inflation and leverage (INF_LEV) is positive but insignificant (see columns 5-10). This means that the deductibility of nominal interest is unable to offset tax distortions arising by inflation and this finding is also consistent with previous studies (Maher and Nantell, 1983; Dhaliwal *et al.*, 2015).

Table 5: Regression results for inflation-tax relation

	Panel A: CTB_CASH						Panel B: CTB_DIST				
	[1]	[2]	[3]	[4]	[5]		[6]	[7]	[8]	[9]	[10]
INF	0.007 (0.17)	0.055 (1.43)	0.010 (0.23)	0.009 (0.23)	-0.036 (-0.73)		0.324*** (32.94)	0.323*** (34.32)	0.323*** (34.43)	0.323*** (34.43)	0.322*** (27.93)
HCE		0.022*** (2.78)						-0.014*** (-7.66)			
SCE		0.600 (0.95)						0.091 (0.53)			
HCE*SCE			0.023*** (2.85)						-0.140*** (-7.93)		

	Panel A: CTB_CASH						Panel B: CTB_DIST				
	[1]	[2]	[3]	[4]	[5]		[6]	[7]	[8]	[9]	[10]
VAIC				0.023*** (2.88)						-0.014*** (-7.90)	
LEV					-0.126 (-0.92)						-0.010 (-0.35)
INF*LEV					0.098 (1.55)						0.005 (0.36)
PPE	-0.868 (-0.60)	-0.490 (-0.64)	-0.705 (-0.49)	-0.682 (-0.47)	-0.703 (-0.49)		1.068*** (3.24)	0.976*** (3.09)	0.969*** (3.09)	0.956*** (3.04)	1.079*** (3.26)
AGE	-1.327 (-1.39)	1.604*** (5.89)	-0.962 (-1.01)	-0.960 (-1.01)	-1.345 (-1.38)		2.278*** (10.51)	2.068*** (9.89)	2.057*** (9.88)	2.058*** (9.89)	2.271*** (10.18)
SIZE	0.401 (1.13)	-0.093 (-0.79)	0.227 (0.63)	0.233 (0.65)	0.372 (1.00)		0.753*** (9.27)	0.849*** (10.77)	0.858*** (10.94)	0.854*** (10.90)	0.754*** (8.90)
ROA	-2.035 (-1.20)	-1.317 (-1.15)	-2.589 (-1.53)	-0.256 (-1.52)	-1.771 (-1.03)		-0.569 (-1.48)	-0.329 (-0.85)	-0.233 (-0.63)	-0.250 (-0.68)	-0.561 (-1.43)
Constant	-6.636 (-0.76)	-1.811 (-0.53)	-2.884 (-0.33)	-3.099 (-0.35)	-5.534 (-0.62)		-10.05*** (-5.05)	-12.14*** (-6.34)	-12.32*** (-6.44)	-12.17*** (-6.37)	-10.04*** (-4.91)
N	813	813	813	813	813		813	813	813	813	813
Overall R^2	0.014	0.050	0.005	0.005	0.013		0.314	0.369	0.371	0.370	0.316
F test	2.40***	2.42***	2.44***	2.44***	2.42***		13.28***	14.16***	14.18***	14.21***	13.09***
LM test (χ^2)	2.05*	2.24*	2.44*	2.51*	1.99*		511.16***	545.18***	545.25***	546.80***	501.29***
Hausman test (χ^2)	11.73**	11.53	10.93*	10.82*	12.45*		183.45***	167.22***	189.73***	189.53***	185.12***

To understand the role of IC and IPR reform, this paper splits the full sample into four sub-samples based on IC as well as IPR reform, and run the CTB and inflation regressions for each sub-sample (see Table 6). Low ICs are observations where the value of VAIC is less than 4.57 (sample median) and it is set to high if the value of VAIC is 4.57 or more. In the sample period (2011-2018), 2015 is considered as Vietnam's IPR reform year; hence, it is set to before IPR reform if the year of observation is before 2015, and after IPR reform otherwise. There are interesting and important findings shown in sub-group. Specifically, I find that CTB is significantly associated with inflation for observations that have years before the year of actual IPR reform. This result suggests that inflation-CTB relation exists only when governments pay less attention to reform IPR in their countries regardless of low or high firm's IC (see columns 1-2). This relation is negative and insignificant for the period after reform, however. The interesting finding support my above argument, reform plays the key role in mitigating the CTB distortion. The results are consistent with the reality of developing countries where IPR are less well protected form governments (i.e., Vietnam).

Table 6: Regression results for the role of VAIC and IPR reform

		Low VAIC Before IPR reform [1]		High VAIC Before IPR reform [2]		Low VAIC After IPR reform [3]		High VAIC After IPR reform [4]
INF		0.285*** (9.17)		0.353*** (6.52)		-0.044 (-0.18)		-0.229 (-0.76)
LEV		0.054 (1.07)		-0.010 (-0.04)		0.111* (1.79)		0.057 (0.95)
INF*LEV		-0.023 (-1.07)		0.053 (0.83)		-0.046 (-1.08)		0.009 (0.25)
PPE		1.109 (1.20)		-2.420 (-0.95)		0.418 (0.74)		0.045 (0.71)
AGE		-0.237 -0.18		5.123** (2.50)		1.636** (2.51)		1.203* (1.69)
SIZE		0.929*** (4.18)		0.175 (0.19)		0.459** (2.14)		0.683*** (3.88)

		Low VAIC Before IPR reform [1]		High VAIC Before IPR reform [2]		Low VAIC After IPR reform [3]		High VAIC After IPR reform [4]
ROA		-0.039 (-.0.2)		-1.837 (-1.44)		-0.784 (-0.82)		-0.303 (-0.47)
Constant		-7.973 (-1.20)		0.348 (0.01)		1.148 (0.22)		-2.986 (-0.67)
N		166		139		216		292
Adjusted R^2		0.714		0.020		0.221		0.282
F test		4.54***		3.35***		22.72***		18.12***
LM test (χ^2)		25.48***		15.12***		91.77***		143.94***
Hausman test (χ^2)		21.56***		15.54**		81.24***		52.51***

5. Conclusion

In this paper, I study the relation between inflation and CTB for non-financial firms listed on Stock Exchange in Vietnam and the potential mediating effect of IC and IPR reform on CTB-inflation relation. To accomplish these objectives, I apply two common regressions, FE and RE Model. Unlike other conventional approaches, this paper follows valuation theory to measure variables and thus it is beneficial for valuers when they apply valuation models in the reality. The findings of this study are that CTB is higher when countries experience inflation and these distortions will be mitigated by countries' IPR reforms as well as firms' investment in IC. These results are valuable at both theoretical and practical significances. For theoretical contribution, this research provides empirical evidences to current literature because it is one of the first papers focusing on the role of IC in mitigating tax distortions. In addition, compared to existing studies, this study applies the valuation theory to measure tax distortions instead of finance theory. For practical contribution, companies are able to make decisions related to invest in IC. Furthermore (and most importantly), for business valuation, tax distortion has been always ignored because of the lack of the appropriate valuation models, and thus, the firm value (presented in valuation reports) has not been accepted by clients sometimes. Hence, the results of this study are also a background so that valuation associations (i.e., ASEAN Valuers Association, etc.) and policy makers consider to adjust current valuation models in near future.

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Interventionist Research Into Value Creation Mechanisms

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Abstract: In exploring the notion of value creation at the interface of the disciplines of IC, KM and business models, this paper discusses the organization of interventionist research activities in order to achieve robust results. We understand robustness in terms of plausibility, which in most research traditions is denoted as validity and reliability. A further important contribution of this paper is to provide insight into the structuring of intervention-based research in combination with non-interventionist type methods, thereby providing impetus for a 'qualitative mixed-methods approach'. Based on a decade of interventionist research relating to value creation in the context of network-based business models including over 100 companies, this paper illustrates the importance of pre-conception and organization of data-structures and research objectives. We argue that interventionist research projects should adhere to a set number of stages and that the motivation for intervention should be linked to expected learning outcomes and how the contribution from the intervention leads to a value-added contribution in comparison to carrying out non-interventionist type research; for example, through the creation of organizational and personal narratives. Finally, the application of intervention and non-intervention creates a strong format for plausible research outputs.

Keywords: interventionist research, action research, plausibility, validity and reliability, value creation

1. Introduction to qualitative research

Without moving into the wider discussion of what the purpose of science is and the discussion of differing world-views, it is the purpose of this article to provide insights into the conduct of interventionist type studies and how to ensure plausible research results in this process. However, it must be recognized that from a paradigmatic stance, interventionist research is positioned in an understanding of the importance of subjective natures regarding the distinction between objective and subjective (Burrell and Morgan, 1979). As a researcher, it is important to understand one's own perspective and comprehension of the world, the truth and how the truth is derived. This is the essence of the theory of science (Arbnor and Bjerke, 2008).

Qualitative research is concerned with understanding, exploring and explaining phenomena. It is not the purpose here to define qualitative research, except that it is concerned with answering questions of the type: how, why, and in which way. For a more thorough review on qualitative research in social sciences, we refer to Lune and Berg (2016).

Qualitative research can mobilize methods that help to answer the research question(s). Such methods may include interviews, observation, workshops, focus groups as well as background and secondary information regarding the phenomena being studied, and these methods may in fact also include quantitative data about customers, markets, products or other forms of statistics. For a thorough review of conducting qualitative research interviews, we refer to Qu and Dumay (2011).

Interventionist research may take the form of a case study, and may apply multiple methods of intervening and non-intervening. The choices and applications would be made in order to ensure the best possible results. This article is particularly concerned with interventionist research of organizations, and organizational networks and the business ecosystem around them, including strategic partners, suppliers, customers, competitors and other relevant public institutions (Laughlin & Puxty 1983). The imperative of this level of analysis is an inductive and interpretive perspective, taking its point of departure in the appeal of the company's top-management team and their decisions. In this sense, the remaining functions in the company (e.g. accounting, business development, logistics, sales, production, marketing) all become a part of developing the company and its strategic imperatives. From such a meta-theoretical perspective, contributions to research are based upon empirical arguments (Mouritsen 1990, 162).

2. What is interventionist research?

In this article, we distinguish between qualitative studies that are interventionist of nature and non-interventionist of nature (see Lukka 2005 for a further explication). In the literature, we find multiple labels for what we here choose to call interventionist research, including the likes of action research, participatory action research and engaged scholarship. Arguably, there are different typologies of performing interventionist research depending on the aim of the research, as argued by Van de Ven and Johnson (2006) and Van de Ven (2007).

In non-interventionist studies, researchers must be careful not to influence the object under scrutiny through his/her actions and questions in order for the research to be as 'objective as possible'. It is a general perception of non-interventionist qualitative studies that validity and reliability features follow those of the more quantitative sciences, best exemplified by the structures set out by Yin (2018). For interventionist research, this strategy of objectivity and non-influence disappears because it is the purpose to study the effects of intervention, influence and opinion.

In the interventionist research tradition, reality is typically considered a social construction, and the world is not independent in itself or existing externally (Koshy et al., 2011). Intervention-oriented researchers assume that the social world we inhabit is co-created, context bound, relational, and situated' (Susman and Evered 1978). In other words, it is possible to change the world through interaction and influence. Hence, researchers make subjective accounts from the participants, the context, the activities and the data collection (Koshy et al., 2011). Interventionist research is an approach which is often used to improve and change practices and conditions, more than producing knowledge and research (Koshy et al., 2011; Coghlan & Brannich, 2004). Interventionist research typically has an ambition to improve the phenomenon being studied, for example in the case of the project illustrated below to improve the business model of the organization and to create a new network-based business model.

Interventionist research has risen from the idea that if you want to understand a problem properly, then you have to try to change it. Lewin (1946) presents a seminal interventionist-based research method and paradigm and argues that it changes the relationship between the researcher and the participating stakeholders from non-interventionist methods. Here, non-scientific participants are involved and seen as a key resource in the process because it is their perception that has to be changed. Interventionist research resulted in the involvement of the participants throughout the process from problem definition, project design, data collection and analysis; the idea of the interventionist research that you 'have to work with local participants to improve local practices' as well as the ideas of the participants must be considered to transform their practices (Ozanne and Saatciolgu, 2008). To summarize, we provide some of the essential characteristics of interventionist research, using Coghlan and Brannich's (2004) framework, in Table 1 below.

Table 1: Addressing the characteristics of interventionist research

Characteristic of interventionist research	How this is addressed in the research project
Interventionist researchers act. Interventionist researchers are not merely observers, they are actively working at making something happen.	The researchers helped the companies innovate their Business Models through participatory innovation activities.
Interventionist research always involves two goals: solve a problem and contribute to science. There is no clear distinction between theory and empirics.	The researchers contributed to developing the Business Models of the case-companies and contributed with narratives and storytelling to the Business Model theory-complex.
Interventionist research is interactive. Interventionist research requires cooperation between the researchers and the client personnel, and continuous adjustment to new information and new events.	The development of new Business Models has been conducted with the companies and through the processes in the project.
Interventionist research aims at developing holistic understanding during a project and recognizing complexity.	When developing new business models, the use of knowledge of the companies' market conditions was essential to ensure relevance and real problem-solving in the project.
Interventionist research is fundamentally about change – Interventionist research is applicable to the understanding, planning and implementation in groups, organizations and Communities.	The purpose of the project has been to solve problems by interacting with the involved companies and changing the way they work with their Business Models and improve

Characteristic of interventionist research	How this is addressed in the research project
	their growth through new ways of thinking, innovating also.
Interventionist research requires an understanding of the ethical framework, values and norms within which it is use in a particular context.	The researchers had background knowledge of business development, financing and market knowledge
Interventionist research can include all types of gathering data methods	The data were collected in different ways, through summaries, interviews, video clips, workshops, evaluations and reflections, informal meetings also.
Interventionist research requires a pre-understanding of the corporate and organizational environment	The researchers had background knowledge of business development, financing and market knowledge

2.1 Understand your own motivation

Why should you bother to carry out research that will be vastly criticized because you have affected the phenomenon you are studying? This is a question we have asked ourselves and our colleagues frequently. We believe that interventionist research is important to the development of theories, but we are also realistic about the offerings you must make. Therefore, we urge you to ask yourself the following questions:

- What is your personal motivation to be an interventionist researcher?

- What do you want to change?

- What do you what to learn from the interventions that you make?

What you should get out of answering these questions is to reflect upon why this research is interesting for you, and why you should bother to go that 'extra mile' to produce new knowledge. Perhaps it is the case that you cannot answer the question that is in your mind without using this methodology, or it may be that you could but are curious on certain elements that cannot merely be observed. Whatever your answers here, we hope that you will be sincere and reflect upon why it is that this methodology is the best option for the question you would like to answer.

It is common knowledge that researchers, particularly Professors, are the most knowledgeable people in the world; at least probably in relation to something highly specific. The positive side of this possession of knowledge is that they are motivated to stay on top of their field, and this motivation typically brings with it a lot of energy and inspiration. Without going into a personality test of academics, with this knowledge often comes a self-confidence that can pressure even stubborn practitioners into thinking out of the box. Thereby, if this on-the-edge knowledge is brought into play, it can create innovative and creative situations and solutions that when tested in the real world not only lead to advantages for the participating companies but also lead to the generation of new theory.

In interventionist research, it is a prerequisite that the participants in the project are somehow affected, perhaps leading to change in behaviour or seeking help to solve problems. It is therefore also a condition, that the participants have an interest in attempting to influence the research project in this case. The relationship between researchers and participants is an issue to address, on the one hand connecting with the participants, gaining trust and getting access to all knowledge, and on the other hand acknowledging that the close relationship that may be built, could affect the documentation and data collection going forward.

2.2 Introducing plausibility

Qualitative approaches to research are often criticized for a lack of generalizability (cf. Lukka & Kasanen 1995); but also, to a significant extent for their lack of internal validity and reliability (Miles & Huberman 1994). According to Easton (1998), validity concerns the inter-subjective convincibility of a study (i.e. the extent to which scholars agree that a study and its results cover the phenomena they claim to embrace). Thus, by taking the point of departure in this conception, validity as a general concept relates to securing the quality of the research being reported. As will be evident from the sections below, validity, research quality and convincibility etc., is in fact far from a homogenous concept, and it relates to a whole array of different research controls and strategies.

According to Modell (2009), considerations of validity require a series of trade-offs between efforts directed at external, internal and construct validation. 'Validity', to a quantitative researcher, would mean that results

correspond to things in the real world, whereas to a qualitative researcher, 'valid' is a label applied to an interpretation or description with which one agrees (Smith & Heshusius, 1986). Thus, the validity controls applied across the separate articles in the dissertation will vary. Some of the most cited authors within the fields of qualitative accounting research, such as Yin (2018) and Ryan *et al.* (2002), distinguish between three types of validity, namely: procedural validity, external validity and internal validity. Procedural validity, by Yin (2018) labelled construct validity, relates to whether 'the researcher has adopted appropriate and reliable research methods and procedures […], addresses clearly specified research questions […] and the case analysis should be fully documented' (Ryan *et al.* 2002, 155), for example by leveraging a tight chain of evidence through the case study data-base. Eisenhardt (1989) argues that achieving strong case studies is a question of inducing a research strategy focusing on a clear problem definition and 'construct validity' through iteration and tightly linked to data.

External validity is often mentioned as a problem for qualitative research because of the inherent difficulties that may exist in relation to generalizability. In this manner, external validity concerns the extent to which the findings of a study can be generalized to other settings (i.e. transferability).

Ultimately, validity concerns the organization of the research process (Turner 1981) and reliability the ability for someone else to conduct the study again under the same conditions and to reach the same conclusions. In case studies for example, the reliability criterion can be strengthened during the data collection phase by using a case study protocol. Another way of strengthening the reliability is to construct a case study database.

In moving towards the application of notions of plausibility rather that reliability and validity, descriptions of the processes of interpretation become crucial to assessing the quality of research processes. We therefore pose a set of questions that must be clarified in order to enhance the plausibility of interventionist research:

- How do you record the events and interactions that you have with the organization/phenomenon you are studying?

- How do you store and access the data and different data-formats?

- How do you analyze the data?

- How do you ensure the validity of the patterns/events you are seeing in the data?

2.3   Combining intervention and non-intervention

Mixed-methods research is simultaneously emphasized as a fruitful strategy for developing novel insights and new knowledge. However, such research is also at risk of being attacked from both sides of the paradigm-trench. This problem is not as clear in the case of mixing intervention and non-intervention methods; however, the combinatorial application of intervention and non-intervention may raise issues for the researcher and his/her documentation and interpretation. Our suggestion is, based on the extensive application of both methods with and without combination, to divide these roles between two researchers as is described below in section 3.2.

3.   Experiences from studying value creation mechanisms

This section reflects the empirical data gathering in a large-scale research and business development project called the International Center for Innovation (ICI) and a series of related spinoff projects. The project, how it was structured and the networks will be described in detail below. The ICI project started in 2008. It was initiated as a business development initiative under the Northern Denmark Region funded by European Structural Funds. The regional government had an ambition to provide new knowledge and tools to strengthen the growth potential of the local businesses so that they could cope better with the global competition.

3.1   Background for the interventionist research project

The core of the ICI projects was the objective to establish 10 sub-projects formed as business-networks (ICI Networks) that each aimed to create a new network-based global business model (see appendix). The cases all represent business model challenges that led to development and innovation of new business models, and testing thereof in the project.

The ICI project focused on the fact that many companies were experiencing that their business model could not maintain sufficient competitiveness, and during the ICI project came to understand that a part of the problem

was that the companies were focusing on product development, and as it turned out, this was not a sufficient focus.

The research project included a range of activities in the 10 networks such as workshops, Interviews and Board meetings, and during the research there was continuous progress in testing the use of narratives by using videoclips and other tools for storytelling and innovation of new Business Models within the Networks. The essence of using the data is the researcher making selected accounts on of all the data that the researcher has been reading and analyzing. Thus, the researcher brings selected accounts to the table in order to present the relevant data to answer the research question.

3.2 Organization of the interventionist research project

It is important to be aware of the role of the researcher in a given research project.
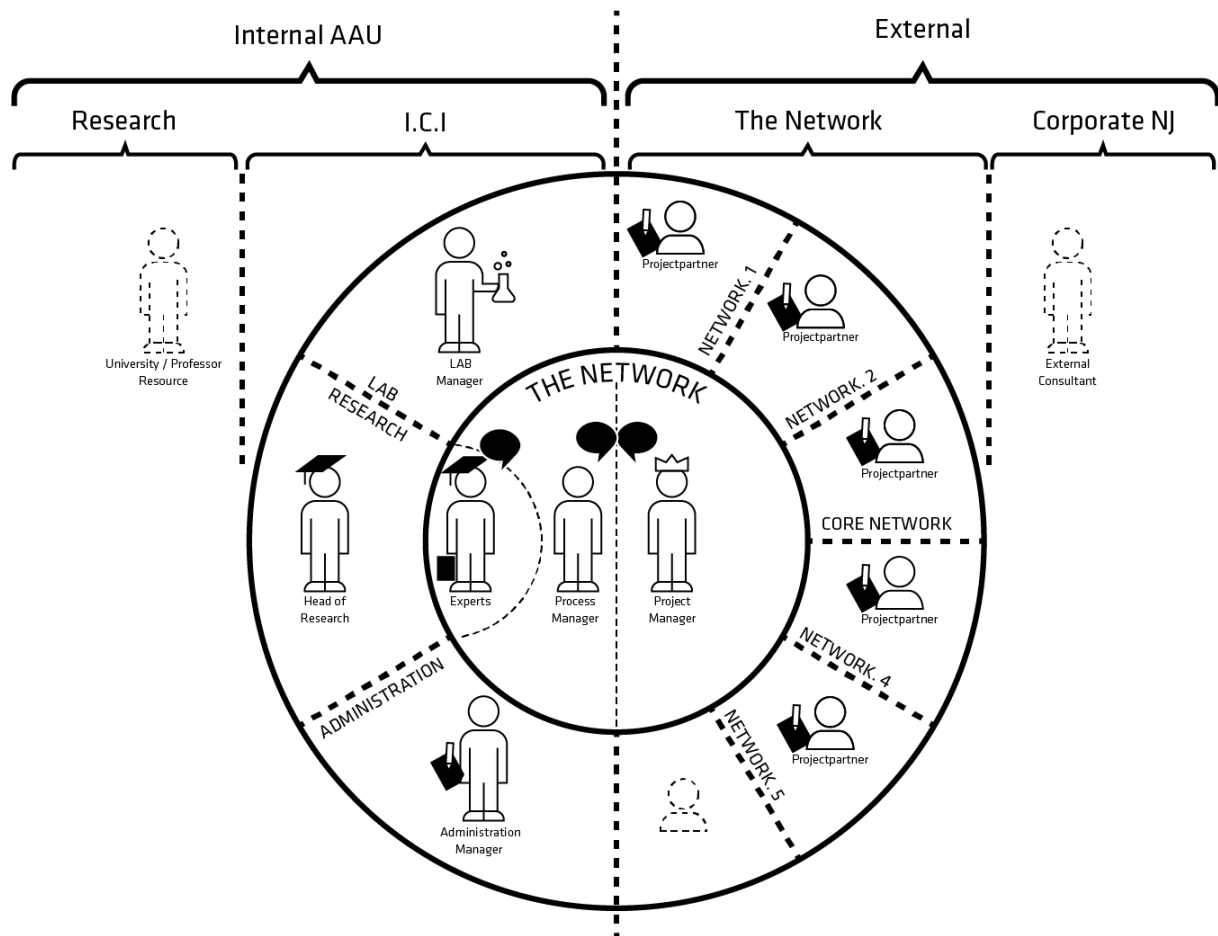
Figure 1: Organization of the ICI project

In each of the 10 ICI networks, there were three primary functions; a project assistant and a project advisor representing the ICI project, and a project manager that represented the companies in the business-network. The project assistant worked as an active part of the project, ensuring that as much as possible of what is going on related to the ICI project is documented and archived. The typical profile for a project assistant was a young consultant, with expertise in process design and a basic understanding of the concept of business models. These assistants proved to be a valuable asset in the ICI project because they documented the process stringency and served as a vast resource to both the project advisor and project manager.

3.3 The data collection

Data collection in interventionist research encompasses a variety of different data collection methods and types of data. The data in the project is collected in a variety of ways including summaries of official meetings, interviews, using video clips interactively, workshops, evaluations and informal meetings. Examples of activities in the data collection of the ICI project are depicted in Table 2 below.

Table 3: Data-collection examples

Phase	Activity	Examples of data
Collecting data in the first part of the period		
Activities in the Networks	Board meetings Workshops on business models	Summaries from meetings Videoclips from workshops Visualizations from workshops (graphics)
Interviews with participants	Interviews	Summaries from interviews
Evaluations of the ICI Networks	Consultants evaluating the ICI Networks	Evaluation reports from COWI
Literature-study	Searching and reading the business model literature	Papers on the Business Model Theory
Data collection in the later part of the period		
Activities in the Networks	Developing new business models within the Networks	Learning and descriptions of new business models
Using video clips for storytelling	Workshops	New insights and narratives on the BM in the Networks
Developing a new framework for business models in narratives and storytelling	Analysis of the BM framework, collected data and process.	A supplement to the business model theory on narratives and storytelling

4. Insights

Following our introduction to qualitative research and from that what interventionist research is, how the quality of such research can be evaluated and communicated, and finally by providing insights from a concrete interventionist research project on improving value creation mechanisms, we now intend to provide a set of insights that we have not encountered previously in the literature.

4.1 Build relationships and trust

As an interventionist researcher, you will be affecting your object of study. Your prior knowledge, your own goals and ambitions as well as your experiences and personality will be a part of this research. Our recommendation is to work actively on building a good relationship with the key participants in the project. Without openness and trust, your interventions risk being whisked away.

Building relationships and trust take time, and therefore, if you do not know the participants in advance, we suggest that you spend some weeks getting to know them, being in the organization, sharing lunch and having a laugh together. These recommendations can easily be accomplished while preparing tasks for other assignments.

4.2 Stages in an interventionist research project

Our experiences lead us to believe that it is a good idea to consider the different stages that an interventionist research project goes through in relation to your planning and the way you interact with the organization.

- Step 1: Pilot the project and devising the initial research question
- Step 2: Organizing the project and contacting a relevant organization
- Step 3: Building knowledge of the organization, relationships and trust
- Step 4: Initiating the research
- Step 5: Iteration of interventions
- Step 6: Evaluating the outputs and effects
- Step 7: Repeating steps 5 and 6 until time has run out or desired results are achieved
- Step 8: Analyzing results
- Step 9: Analyzing processes
- Step 10: Writing up the research and disseminating it to practice and to academia

Across these stages, the design of the interventionist research project should account for whether there may be a difference between the weight of intervention versus non-intervention research methods across these steps in the given project. In some projects, it may be an advantage not to affect the object of study too much, or too early, in the process; in other projects, it will be the other way around. The most important aspect here is to be explicit about it because the best solution will be context dependent. In some instance, the organization being studied requires an early boost of inspiration to get going, and in others the organization is already innovating full speed, but perhaps without clear direction. Make sure to note down your thoughts in entering the process and provide an explanation for the strategy of engagement that you choose to go with. Remember, participating and taking over are two different ways of engaging with an organization. Make sure you act appropriately despite probably being the most knowledgeable person in the world.

There is a natural tendency for the need to build upon the relationship in the early stages of an interventionist research project and to let the relationship and trust grow during the iteration of interventions and collaborative evaluations of the results. However, in steps 9 and 10, the researcher will experience the backdrop of the closeness in the relationship in the analysis process and should make careful note of when he/she may not be truthful to the data but rather is affected and subjective in the conclusions being drawn.

4.3 Four-step process to making interventions that matter

Above, we described 10 steps in an interventionist research project. In steps 5 to 7, you are 'on stage' so to speak, and therefore how do you handle that situation and what do you do? Many novice interventionist researchers ask themselves 'How do I intervene; When do I intervene; When do I know not to intervene but let things go with the flow; when do I know what to do next, and how do I keep at least one step ahead of the participants?

When planning interventionist research, it is important to leave space for the unexpected. However, not having expectations, or worse yet, not being properly prepared is not a good option. As is the case with all other research, good planning is never a bad thing. In the worst-case scenario, your good plan needs to be adjusted after it meets reality. Remember, the devil is always in the detail and therefore having thought through potential scenarios and having a back plan-of-action is always a good idea.

Any monkey can make an intervention. However, how do you make interventions that matter and make a real difference? This is a subjective matter and will most likely be in the eyes of the beholder. In other words, what matters for you, might not matter for us, or for the participating organization.

Therefore, always keep your process in mind; and try to envision the next step. As any good chess-player, once you are trained in the skills of intervention research, you will find yourself acting on pre-established patterns that reveal themselves throughout the process. Below, we have identified a 'four step process to making interventions that matter':

- **Depart from a contextual understanding.** Make sure you understand the context and how existing practices may be rooted in institutionalized and culturally borne practices that may be difficult to alter in the short term.

- **Provide an air of change or newness.** Challenge existing knowledge, existing structures and existing ways of doing things. Your intervention must introduce something to the participants that represents newness.

- **Plan your process and your communication of the intervention.** Make sure to create some form of excitement among the participants to ensure that what you are discussing is viable and that it will have an effect that can be seen outside of the room.

- **Keep it simple and concrete.** Make sure your intervention is concrete enough for the participants to understand how they should react to it, and make sure that if you propose a change that it is implementable.

4.4 Data structure and data-discipline

Data-discipline is crucial. Leaning on the recommendations of Yin (2018), keeping a research protocol is an important aspect of qualitative research. Hence, we also recommend using a researcher diary to enable reflection upon how your own thoughts have developed throughout a given research process. Below, we illustrate how the data were organized in the ICI project.

From the beginning of the ICI project, effort was made to ensure that as much of the activity of project as possible was documented and that this documentation was structured.

5. Concluding remarks

In this article, we set out to contribute to how the quality of interventionist research may be enhanced. We discussed differences between qualitative and quantitative research as well as variations between interventionist and non-interventionist research approaches. Accordingly, we introduced the notion of plausibility as a preferred measure of research quality in opposition to quantitative research and a major fraction of qualitative research. From these outlines, and through the example of an empirical interventionist research project, four main insights were provided. First, our empirical probing uncovered the importance of building a relationship and building trust between yourself and the responding partners in the interventionist research. This is an aspect that has not received much attention and would warrant further research for the sake of training younger scholars. From our studies, we argue that interventionist research projects should adhere to a set number of stages and that the motivation for intervention should be linked to expected learning outcomes and how the contribution from the intervention leads to a value-added contribution in comparison to carrying out non-interventionist type research, for example through the creation of organizational and personal narratives, of which you as a researcher must partake in. Our examples lead us to provide indications for what a good intervention is. We argue that as an interventionist researcher, you should always plan to be agile. To improve the quality of your interventions, you need a good understanding of the contextual setting and to provide an air of change or newness to your audience. Further, take care to plan your process and your communication of the intervention, and finally keep interventions simple and concrete. Finally, we also found indications that the application of intervention and non-intervention in conjunction creates a strong format for plausible research outputs because it releases the researcher from the paradox of not affecting the object of study too early in the process but still wanting to provide intervention before participants become impatient.

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Micro-Intellectual Capital: A Case Study of Dutton Speedwords

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Abstract: Micro-Intellectual Capital (MIC) is the knowledge which individuals develop, retain, and share at their discretion. Theorising MIC has two separate advantages. One is that the activities can be decomposed into knowledge flows and stocks to determine relative contribution. The other advantage is that strengths and weaknesses in MIC can be identified. The strategic advantage of theorising MIC is that the level of analysis does not have to occur at higher abstract analytical levels such as the university or country where it is IC. In turn, this enables attention on the origin and development of knowledge. A 2013 case study of classroom activities found MIC could be identified by considering knowledge flows and stocks. This study moves knowledge to the foreground by examining knowledge acquisition and sharing which can occur with learners (who may be students, employees or members of the general public). The contribution of this paper is to extend MIC theorising by recognising prior forms of knowledge embedded in systems or conventions and showing how tools can facilitate MIC. It shows that technology is insufficient by itself and the active engagement by the learner that facilitates comprehension and understanding as well as motivation contributes to MIC through a sense of progress or personal achievement. The nature of current world economic and political events highlights the importance of international understanding and it is facilitated by direct communication. Countries tend to privilege their own language and culture and opportunities are therefore lost in international communication through the lack of a shared language. Speedwords was designed with both these purposes and evolved over 50 years as a small vocabulary language (493 words) with extensions allowing different meanings to be conveyed. The small vocabulary was designed to make learning easy and encourage wide use. A dataset of the vocabulary was built from the instructional manual in the way its author intended and is then evaluated for MIC using the twin criteria of how Speedwords can build MIC both in learning it as well as in its usage. The findings show that Speedwords does built MIC owing to the way its author provided the learning instructions and constructed the vocabulary that they use. Some impediments were found owing to the age of the exercises used in some instruction and the absence of an explanatory rationale behind the construction of the vocabulary. Overall, it found that the resulting MIC combines learning and innovation or creativity. It highlights that learners may be unaware of their own MIC until they are required to use their knowledge.

Keywords: higher education, innovation, knowledge, knowledge flow, knowledge stock, learning, micro-intellectual capital

1. Introduction

IC looks at aggregates to form a view of the intangible value of an organization, particularly the importance of people (described as human capital). Early studies of IC were successful in showing the balance sheet (statement of financial position) lacked important information (Brooking, 1997; Edvinsson & Malone, 1997). Later studies of IC have expanded its scope to consider the creation, and maintenance of the stocks of intellectual capital in an organisation (e.g., Choo & Bontis, 2002). This has led to the recognition of the contribution of knowledge and concern to integrate IC at both the operational and strategic levels (e.g., Wiig, 1997). A recent area of IC recognition is innovation (Subramaniam & Youndt, 2005). Innovation combines human capital with social capital to aggregate value at the organization level (Coakes & Bradburn, 2005). It also occurs at the individual and group level where they apply a useful new solution. In contrast, Micro Intellectual Capital (MIC) is concerned with knowledge at lower levels that may result from a process or outcome. It is consistent with IC because its focus remains on stock of knowledge, but it is also concerned with flows into and out of those stocks as they can often be more readily identified (Oliver, 2013). The findings of that study showed that flows could be categorised using the four broad kinds of IC (human, structural, technological, and relational) although each is influenced by industry factors (Shih & Lin, 2010) as well as technology effects (Wu & Tsai, 2005). There is a choice of terminology: human capital (from management, that is skills, knowledge) or social capital (from sociology, that is, learning and knowledge from meaningful interactions is one of disciplinary perspective; this paper uses human capital. When innovation is considered, there is MIC with stock of knowledge as the case study of Speedwords illustrates.

The motivation for this case study is the potential for artificial languages to improve the understanding individuals have of other individuals with different backgrounds and values through facilitating communication continued to be overlooked. For example, the EU mandates three languages (English, French, German) with the status of English uncertain owing to Brexit. The OECD acknowledges that improved language competencies is valuable at both individual and societal levels but then considerably increases the burden of learning by

recommending high literacy skills in the national language(s) as well as increased proficiency in non-native languages. (Della Chiesa, et al, 2012). Perplexingly, the opportunity offered by a systematised planned or constructed language is never explored in this OECD report. Speedwords is an artificial language designed to facilitate individual comprehension and assist communication with a wider group of people than ordinary would be possible using the person's own language. Considering this in relation to MIC raises two questions. First how could Speedwords assist creation of MIC that might potentially contribute either knowledge or leverage IC? Second, can some reason be found within the IC framework for its lack of adoption? This is not taken as an issue of diffusion because its existence can be easily discovered (e.g., with google search) and its features are easily understood (e.g., from the Wikipedia entry).

The contribution is incremental. Nicholson et al (2018) comments that the evidence for this claim requires an account of theoretical utility and practical benefits. The utility is found by applying a conceptual approach to a neglected area. Originally, MIC theory focused on flows in preference to stocks but overlooked the aspects of learning and innovation (Oliver, 2013). This study remedies those shortcomings. It examines how stocks created by others can build MIC and then links the learning that occurs to the broader gains for societies globally and shows how the learning may involve innovation. To do this a dataset was created which is available in a spreadsheet to other researchers. This dataset has not previously existed. The practical contribution arises from confirming the potential of Speedwords for international communication using accepted evaluation (e.g., Halliday, 1994, 2009). It highlights the opportunity for easier communication using a simplified language at a time when few people share a common first language (Maxwell, 1989) and communication is becoming fraught with offence-taking and insular interests. The findings indicate that there is an opportunity for Speedwords to resuscitated for international communication.

2. Theory development

IC leverages knowledge but this assumes there are defined means for generating knowledge. This has been an abiding issue in IC since Wig's (1997) article in the Long Range Planning journal. It emphasised IC is renewed and maximized by coordinating and exploiting both knowledge and intellectual capital to create balanced yet interacting IC. Although Wig saw this being achieved by knowledge management and its tools, there are other views. Nonaka and Takeguchi, (1995) prioritise processes. They claim that knowledge is transformed by processes and one important process is socialisation. Roper & Love (2018) consider IC is connected to innovation and learning. They found that high degrees of human and social capital stock reduce the speed of decay of new what in effect is MIC. This supports early views that knowledge which is 'sticky' requires significant effort to share (Szulanski, 1996). The result is IC is unavailable for organisational learning. Organisational learning is process of creating, retaining, and transferring knowledge that involves the individual and the group. Of course, the learning that someone brings to the organisation and how they apply it depend on both organisation factors (e.g., incentives, controls) as well as individual factors (e.g., personal disposition, time available). Levitt and March (1988) showed that organizational learning is routine-based, history-dependent, and target-oriented but is complicated by the copying behaviours of organizations, and by an endogenously changing environment. At the time they wrote, routines were often part of the quality management standardisation of operating procedures and may still differ from actual practices. More recently, Seleim and Khalil (2011) suggest that there is a two-way connection between IC and knowledge particularly. Against this background, the intermediate stages of building MIC from a stock of knowledge is an innovation from learning.

The theory relevant to the case is systemic functional grammar. Originally developed by Halliday (1994) for learning languages, it uses grammatical description or functional linguistics. The term emphasises language is a network of sets of options for making meaning. In other words, language is as it is because it evolved from human experience and interpersonal relations. It evaluates language related tools on three dimensions: ideational, interpersonal and textual. Ideational construes human experience. Interpersonal concerns the speaker or author. Textual concerns grammar, syntax, and phonetics. Halliday (2009) accepts that the same words have different meanings to people, and some may be unconscious. Moreover, his theory takes into account Asian languages having worked with scholars in China (2009). This theoretical position has two implications for evaluating Speedwords. First it requires going beyond semantics This draws attention to the importance of people's perceptions in relation to their language. Second it underscores the importance of highlighting inconsistencies or anomalies as possible impediments to agreeing on meaning. In summary, knowledge depends upon the resources of context, and language as they affect meaning, and these will require attention.

3. Methodology

To examine the potential of learning and innovation in MIC, a case study was the approach selected. One objective of the study was to avoid ethnocentric bias by considering a supra-national system, and this required a system that sought to increase the speed and brevity of writing as compared to longhand were investigated. Typically, these are shorthand systems which use script symbols (e.g., German Gabelsberger shorthand), geometric shapes (e.g., Pitman shorthand), or combinations of both (e.g., Gregg shorthand, Shavian alphabet). The alternatives are artificial languages that use abbreviations of the alphabet with the aim of facilitating communication between people who would otherwise have no other language in common. One candidate is Esperanto which uses a Latin script plus letters with diacritics. These can be typed on a standard keyboard using the h-convention or the x-convention (Cresswell et al, 1992). The goal of Esperanto was to be a universal second language to foster peace and international understanding. Thus, it is similar to Speedwords. Esperanto was discarded in favour of Speedwords because Esperanto has been proven hard for non-Europeans to lean (Forster, 2012) and Speedwords is wholly Latin alphabet-based.

Appendix A describes assumptions and criteria for a language for communication and note taking which is used to assess Speedwords. Dutton (1886-1970) assiduously developed the compact vocabulary (493 words) of Speedwords initially for international communication (Dutton, 1935, 1936a, b) with further refinements (Dutton 1945). By 1950, it was marketed as a fast note taking method with international communication capability (Dutton 1951, 1971). Dutton saw it as superior to Esperanto as it required less characters. Dutton also championed its advantage using ordinary Roman letters to represent the semantic qualities of words avoiding using unfamiliar symbols. Dutton also formulated his words based on reported frequency of use (Zipf's law). These advantages remain largely unchallenged. However, there is no empirical evidence from users available. Expert assessments are favourable (e.g., Foat, 1936). Reviews of it for communication rated it better than Esperanto (Partridge, 1936; Bodmer & Hogben, 1985, p. 517). Some critical commentary on website blogs echoes criticism of the complicated pronunciation (Kenaway, 2019) which is excluded from this examination owing to space constraints.

4. Data and findings

The dataset on Speedwords used in this study was created from the Speedwords appearing throughout the only available instructional book on Speedwords (Dutton, 1971). A description of the dataset is provided in Appendix B together with an extract, as the entire dataset is over 30 pages. Speedwords first appeared in the teach yourself series in 1951 and was reprinted 1959, and 1962. It was revised in 1971 and the last reprint was 1973. A comparison revealed the editions to be identical apart from changes made in 1971 to the high-speed appendix (1971: 137-147). The book structures learning around eight lessons. Each lesson opens with a list of Speedword-English equivalents followed by commentary, specimen sentences, exercises and examination. The commentary has numbered paragraphs, apparently to indicate they are explanatory amplifications of the list. Specimen sentences demonstrate the vocabulary from the list. All exercises have answers provided at the end of the book. An examination/test appears encourages stopwatch timing. A further chapter containing nine speed drills is provided to improve ear training and require the learner to read back their Speedwords immediately after recording them. Dutton recommended that the drills be dictated by a friend to improve transcription speed (1971, p. 81). Apart from this advice, the only other recommendation by Dutton is to reverse each exercise task to increase practice (1971, p. 113). It is assumed that the learner will not encounter difficulties because the exercises appear to be graded in difficulty.

Completion of the entire course of eight lessons is stated to require 20-24 hours of study by a "student of average intelligence" (1971, p. 9). This is drastically less than the time to learn shorthand (1 year) or Esperanto (6 months). Although the main principles that are the foundation of Speedwords MIC are stated throughout the lessons they are never summarised in the way presented below. The primary principle is to use words which can be spelt with the fewest alphabetical English letters (Dutton, 1971, p. 9). This is fundamental to Dutton who throughout the book counts the number of letters in English and compares them to the number of letters in the Speedword. The reduction is almost 60% calculated using the percentage decrease method. This is unmatched by other systems (Janek, 2019). The second principle is to use abbreviations that are similar to words in other languages (Dutton, 1971, p. 8-9, 88). The third is 'one word one meaning' (p. 18). By this Dutton means that synonyms will be eliminated and only the (specified) Speedword can express the idea. The fourth is to omit meaningless words (e.g., 'to', 'there' as in 'there are', 'do' after adverbs) that are frequently used in English unless they convey meaning (pp. 12, 14, 21). The fifth principle was to use the same Speedword irrespective of

part of speech (noun, verb, adjective, preposition or adverb) to save time and effort (p. 81). The sixth is to use context to determine meaning (p. 24, 77). The sense of the sentence determines how much of the sentence can be shortened. The seventh is to express new ideas by building on the primary Speedwords (p. 88). Suffixes are added to existing Speedwords to create contrary, associated meanings or favourably rated existing word-roots, or, Speedwords are combined to create a compound Speedword. The final principle is to truncate frequently used Speedwords (e.g., 'what' is abbreviated 'qid' but is truncated to 'qd' (p. 18). Taken together, these principles demand any learner is able to recall the Speedwords at will, and where appropriate select the one for which a suffix is apt or the pair which can be combined. Although Dutton then illustrates the same Speedword with different English parts of speech (e.g., think, thought) in a sentence this involves tense which is designated by the prefix 'y' to the verb which Dutton (1971, p. 33) requires practised by rote. Thus, learning Speedwords develops MIC through a combination of exposure to words and sentences. Halliday (1994) who rejects attention to parts of speech, suggests that this kind of learning helps understand how meanings are coded into wordings and this consistent with his view that categories are set up in the description of particular languages rather than being theoretically derived.

The Speedwords used in this study have been obtained from the final revised edition of Dutton (1971). It contains an alphabetic list of Speedwords-to-English (pp. 92-101) and English-to-Speedwords (pp. 102-112). Although Dutton did not specify the revisions, a comparison between the 1959 and 1971 editions reveals the only change is in the appendix on high speed words used when handwriting to allow literal recording of conversations. The high-speed words have been excluded from this study because they either allow joining or contraction of individual Speedwords (1959, p. 137) and they cannot be checked against the dictionary apparently containing 4,000 Speedwords which has so far proven unobtainable. This study focuses on the Speedwords-to-English list which contains 633 words and the English-to-Speedwords list which contains 709 words. This apparent discrepancy arises because many English words are reduced to a single Speedword owing to them being synonyms. The dataset created for this study therefore uses the 633 Speedwords. When the Speedword dataset was examined it was possible to see that the compact size of vocabulary (in conjunction with spelling and grammar) could produce cohesion (Halliday, 1994). That is, a learner could from the instructional tasks provided in the book build their MIC from their newly acquired stock of knowledge and its use proven in exercise drills and dictation. One further finding is made which concerns the vocabulary and referring to Speedwords.

The second finding concerns the difficulty in ensuring vocabulary is kept compact. This requires the Speedwords user to actively remain aware of the suffixes that can be applied. Dutton comments that he uses the structure of Roget's Thesaurus to select word-roots and to form synonyms and antonyms. While Speedwords provides the learner with the ideal set of words to use, the learner must actively work to retain the Speedwords. To facilitate this, Dutton provides the learner with many explanations of the source of the Speedword. For example, the English word 'which' has the speedword equivalent 'qu' from Latin 'que'. There are also reminders on how the related words are linked to a basic Speedword by using the suffixes. Dutton emphasises familiarity is achieved through practice. Although completing the entire course of lessons is required to master Speedwords, partial engagement can still build MIC. For example, selected Speedwords are intended to be used, by themselves, once known, for example, when making notes or a diary entry. Since Dutton created the Speedwords based on their frequency of use, his approach of allowing the learner to select the Speedwords they need to use assumes they will benefit in time and effort from using frequently used words. This will further build MIC. Sweller et al, (2011) provide evidence that learning is improved when the fundamentals the system are explicated. The learner is building ancillary MIC by cognitively recognising similarities and differences in the Speedwords they use.

In summary, Speedwords contains many contemporary learning approaches. Dutton anticipates cognitive load effects (Sweller et al, 2011). Cognitive load theory requires distractions to be eliminated and a single focus of attention. The lesson format and approach achieve this goal. Dutton also provides proximal scaffolding (Vygotsky, 1987). The lessons are divided into discrete sections with hints on the Speedword to use. Thus, the rote learner is well-catered for. MIC is built throughout the learning stage which includes practice. In fact, the majority of time and effort in each lesson is spent applying the knowledge and this reinforcement is deliberately intended to make recall automatic ensuring the MIC does not decay in long-term memory. The problem of assuring MIC is the focus of the discussion.

5. Discussion

Two potential pitfalls to building MIC are evident. The learner whose style is one of inquiry may encounter delays or confusion which could prevent MIC. The least serious arises from Dutton's unclear terminology. In the lessons, he uses the expression word-roots (e.g., p. 24, 34, 37), parent word (e.g., p. 51) and radical (e.g., p. 51) seemingly interchangeably. However, this then leaves no means to distinguish the basic Speedword from one with a suffix. As a result, learning may be incomplete and as a result MIC may be described as tentative until there has been reinforcement in use or comprehension through reflection. In Dutton's defence, his lesson approach is clearly designed to not bother the learner with terminology and focus only on learning the handful of Speedwords in each lesson word list. So Speedwords which appear arbitrary (e.g., e.g., the English word 'position' has the Speedword equivalent 'sit' which uses the letters from within the word) build MIC by showing there is no word-building rule. This is the case in other artificial languages. But it does mean that if a learner requires a Speedword for a term not in the Speedword lists provided, they will need to use trial and error problem-solving technique which is unlikely to reveal all possible options or even the best solution. not ideal. Nevertheless, this may produce MIC through conscious recognition of the limitations and need to accept the solution is interim, that is subject to review in practice (Subramaniam & Youndt, 2005). In summary, Speedwords is constructed around clear principles but lacks consistency in the construction of its words.

This criticism is temporarily muted as the vocabulary appears to breakdown into two groups. Dutton (1971, p.9, 89) comments mastering Speedwords requires knowledge of 493 words which comprise 200 parent or radical Speedwords together with 240 derivations by adding suffixes and making compound and a further 50 from compounds of existing Speedwords. For example, 'wy' is 'white' and when the suffix 'x' is added it is 'black'. The learner is therefore provided with two additional constraints they must actively achieve. The first is to use the highest frequency words because have been allocated a single letter (1971, p.7) and that produces the most compact communication. The effect can be seen by comparing speedwords with Esperanto using the same baseline. The teach yourself series publishes both books. Speedwords (Dutton, 1971) is 160 pages, mainly of lessons with a 600-word dictionary. Esperanto (Cresswell, et al, 1992) is 259 pages also mainly lessons with dictionary. Clearly the vocabulary of Speedwords is much smaller but this arises from eliminating synonyms. The second constraint is to differentiate between synonyms and associated words. This is adding a suffix to an existing Speedword to indicate it is numerous, larger, or more intense. For example, "attention" represented as 'en' can be augmented to "careful" and represented as 'ene' with the suffix 'e' (Dutton, 1951, p. 37). This innovative differentiation of augmented associations from synonyms effectively substituted simple rules for principles and focuses MIC on procedural knowledge. However, a thorough MIC view of Speedwords requires evaluation of its capabilities to build knowledge. In IC, this is traditionally done through considering facilitators and impediments (Paulin & Winroth, 2013).

The facilitators that build MIC are construed as learning capacity for Speedwords and its utility. Learning involves the antecedents of motivation and available time which Dutton (1971) assumes. Motivation takes the form of intrinsic interest since Speedwords is not mandated as credentialed learning. Although there are 86 rules (Dutton, 1971) this is not necessarily a disadvantage when compared to the number of rules in other artificial languages. Unfortunately, there is no independent evidence available to corroborate these claims although some anecdotal evidence (Brown, 2019) that Speedwords was easy to learn and use. The utility of Speedwords is closely associated with its practical uses. Unlike many instances of stored knowledge, the MIC of Speedwords is permanent. Hardly any changes were made to the lessons between the editions (Dutton, 1951 and 1971) so this suggests that learning is not disrupted by changes to the vocabulary, spelling and grammar. Again, there is a lack of empirical evidence on patterns of adoption, usage and abandonment. This is canvassed in the conclusion.

Impediments to building MIC with Speedwords are found outside its vocabulary. The list of speedwords is approximately 75 years old (Dutton, 1945). Since the list has not been updated it has not kept up to date with usage. This means that technologies and processes either have to be represented with generic Speedwords or constructed ad hoc. In either case there is the likelihood of ambiguity and confusion if the writer attempts to communicate with a recipient without reaching any preliminary agreement on Speedword meaning and usage. Clearly this defeats the original objective of easy and reliable communication, especially international communication. In these circumstances the absence of any explanation on constructing (new) speedwords is detrimental to building MIC. One MIC related innovation is to create new compounds. For example, mobile phone could use combine the word-roots 'tra' for 'transport' and 'zee' for 'wireless' to give 'tra'-'zee'. While this

initially appears an odd pairing, it must be remembered that Speedwords deliberately uses a generic word-root to completely avoid burdening the learner with synonyms. This does not affect the MIC but in the absence of an active community of practice it makes learners solely dependent upon Dutton's comments made during the instructional commentary of the eight lessons. In summary a review of facilitators and impediments highlights some concerns but suggests that using Speedwords can build MIC provided the caveats of new word usage and the lack of meta-description with the lessons is accepted. Dutton Speedwords was formulated for communication and these concerns arise from that objective. Where Speedwords is intended to be used for solo work these caveats do not apply. However, Dutton would suggest that the MIC built by knowing Speedwords ought to be at least trialled in international communications.

6. Conclusion

The potential for adoption of artificial international languages (IAL) such as Speedwords appears bleak because the OECD arm of the UN endorses the retention of national languages and chooses second languages from among them (Della Chiesa et al, 2012). This strategy is also adopted by the EU. So, the use of an IAL rests with individuals. A comparison with the history of Esperanto shows flourishing, withering, and revival phases. It is reasonable to expect the same with Speedwords as they have the same underlying MIC profile. That is, they have the capability to build MIC but without organizational or institutional adoption they are unlikely to gain mass appeal. People who reject technology and champion simpler lifestyles may find learning Speedwords attractive and this may be the catalyst for Dutton's hope that it is used for contact with like-minded communities internationally.

The study has a limitation in that the author did not have access to all the published works. It appears the only source is the British Library and they report their holdings have missing items. Access would examine the evolution of speedwords both from its shorthand origins as well as from its conversion to use the alphabet as World Speedwords. Currently, Speedwords is in a withering phase. One possible factor highlighted earlier is the difficulty with the pronunciation rules. Brown (2019) has suggested there may exist an unpublished simplification. Another factor is ambiguity in which are the word-roots and how are they are constructed. Little help is available from an internet search. Many URL's are no longer active. Many webpages are poorly referenced and make statements which lack scholarly reasoning and apparatus. Further work is proposed to determine how contemporary terms would be systematically constructed and assess the MIC associated with the process. Even the Wikipedia article requires correction and amplification. These are directions for future research and dissemination.

Looking globally, there is still a considerable level of illiteracy and single-language only speakers. Many proponents of IALs have pointed to the prerequisite of understanding for world peace and that this can only be reached by full and frank debate. Such a debate will involve controversial ideas that some people may find offensive. For people to put them forward in a form that seeks not to stir up hatred or malice but appeal to the human capacities of reason and assessing claims with evidence will require international communication by people who do not speak the same language. The widest exposure and assessment can potentially be with artificial languages designed for international communication such as Speedwords. The compact vocabulary should help formulate a reasoned response to any conclusion that appears objectionable by focusing on flaws in the argument or evidence. It is the intention of this author with this paper to both involve more people in debates about significant issues and propose that the examination of Speedwords as one vehicle for achieving heightened debate while simultaneously increasing MIC.

Appendix A: Assumptions and criteria for a language for communication and note taking

When communication occurs among people from different nations who do not share any languages in common the speakers have expectations and criteria which may not be made explicit. The purpose in stating these as assumptions is to identify issues and constraints that may affect communication and judgements. These have been located in discussion in the linguistics literature on English as an international language, auxiliary international languages, and constructed or artificial languages.

- It is difficult to evaluate any proposed artificial language despite being well-intentioned (Couturat et al, 1910);

- If its vocabulary is assembled from a broad variety of languages, this does not make the language any easier for speakers of any particular language. (Gode, 1951);

- A set of linguistic concepts that assists analysis and description (Crystal, 1993);

- Attempts to control the range of human thought by constraints on concepts (e.g., "freedom") will fail as they will reappear in new words (Pinker, 1994);

- The internationality of a language has more to do with the culture of its speakers than with its linguistic properties (Harlow, 1995);

- Adoption of an international language might hasten the extinction of minority languages but even if this happens, the benefits may outweigh the costs (Dorian, 1998); and

- Although western languages are the unofficial languages of international science, medicine, and technology, some may agree an alternative vocabulary has merit (Maat, 2016).

These assumptions lead to the requirements that any transcription, note taking, or correspondence system must fulfil. Again, these were located in the linguistics literature to confirm their broad applicability in studies of language:

- Significantly simpler, and thus more easily learnt, than national or "natural" languages (Large, 1985);

- Rules for ensuring an agreed vocabulary including how technical terms are expressed and the inevitability of word coining and combination (Pei, 1949);

- A systematic method for representing the vocabulary allowing for abbreviations (contractions or truncations), particularly where literal transcription is necessary (Eco, 1995);

- A pronunciation system that makes the vocalisation meaningful (Ladd, 1996);

- A meaningful word order and constructing meaningful units (Sabin, 2010);

- Rule for designating, recognising overlap, or rejecting parts of speech (Kinnear, 1904); and

- A method for learning the new system of communication (Howatt, 1985).

- Promotion is as important as the linguistic features and capabilities (Sapir 1925)

The system of Speedwords created over 50 years by Dutton addresses all these requirements. While it is biased toward English this is a reflection of the place of English in communication and commerce (Crystal, 2003). Other systems have copied the solutions devised by Dutton without greatly improving on his approach. One major advantage of Dutton's Speedwords is that it is readily available to everyone. Its current competitors require pre-payment for materials before revealing the full details of their system.

Appendix B: Dataset

A comprehensive description of Speedwords in the form of a Microsoft Excel formatted spreadsheet is available from the author. It encompasses 48 tabs. The primary tab is a table of Speedword-roots with their prefixes, suffixes, contractions and compounds. An extract of this table appears below. In addition, there is a tab with the root-words for common topics (business, cardinal numbers, colours, days of the week, gender, humans, months of the year, ordinal numbers, spatial, technology, and, time). There is a tab with a count of word lists for each to indicate the volume of rote learning required. There is a tab which reconciles the number of words in the various lists with the target total of 493 claimed by Dutton (1971, p. 9, 89). While the book has a brief index, it is not comprehensive so there is also a list of the numbered paragraphs interspersed throughout the book showing the topic or subject matter of each numbered paragraph which can equate to riles for Speedwords.

Table 1: Extract from the dataset indicating the basic Speedword in column 1 with its English equivalent in column 2. The basis for the word is shown in column 3. Its source from the Learning Speedwords List is shown in column 4. The remainder of the table shows the suffixes used to generate other meanings (e.g., associations, causes related pairings, emphasis, diminutive, contrary). In the Table (v) and (c) are used to action a rule that determined which suffix is used depending upon whether a vowel or consonant is the last letter of the Speedword. (Font and column widths are collapsed to show the many meaning variants potentially formed from each basic Speedword).

1	2	3	4	ENDINGS / VO-ICE	ASSOCIATION TYPE	CAU-SE	PAI RIN GS	DIM-IN-UTIVE	PO-SSIB ILIT Y	NEG-ATION	REV ERA L	AGREE-ABILITY	AUGMENT
		Sour- ce of Speed word and - mem- ory aid to learn it	TYSDS Learning List	Pl ur al	Pe rs on	Caus itive	Com ple men t	Little		Negativ e	Cont rary	Unf avo urab le	Favo urab le relat ion
				Close relation ship / Pass ive -ing	Special on								Inte nsify or amp lify
					Ge ne ral / Pl ac e / Th in g / Coll ecti on								Very + qual itati ve wor d
				z u / d i|c)v	r l g p m c	f (v), y(c) s	-t	-t	b	n	x (v) o(c)	a u	e e e
s p e e d w o r v a d	E n g l i s h e q u e n t												
a x	to, to wa rd (to) as k		C / B	ap pl y, lic ati on						a n s	a w / a a / o y / a w x e o r		
c	thi s	Frenc h ce	A cz e									c a u t	t h a u t

pronunciation of Speedwords Richard Kenaway. For an exhaustive list of Speedwords publications, showing the connection between Dutton shorthand and Speedwords, University of Wisconsin at Madison Library. For assistance obtaining Speedwords publications, Emma Hastings at The University of Sydney Library.

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The Interrelationship Between Knowledge Governance and Absorptive Capacity: A Necessary Convergence

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Abstract: Learning occurs cumulatively when we consider that organizations have prior knowledge. This existing knowledge base is necessary for the effectiveness of the absorptive capacity and allows organizations to recognize and utilize external knowledge. In this way, absorptive capacity is related to governance at the point where intra and interorganizational relationships occur. Its usefulness to this relationship is perceived at the moment that organizations depend on the permanent recombination of external and internal knowledge, providing agility and making them more competitive. Taking this as a basis, the present article analyzes the interrelation between knowledge governance (KGOV) and absorptive capacity (ACAP) through a theoretical-conceptual study. We conducted research on the Scopus and Web of Science databases using search terms that brought the intersection between the two topics under analysis and resulted in an insignificant number of publications. Of these publications, none deals specifically with the relationship between the two themes, but only individually. We note from the analysis performed the incipience in the relationship between the two constructs, which justifies the accomplishment of more in-depth studies. By elucidating the relationship between knowledge governance (KGOV) and absorptive capacity (ACAP), it will enable the use of internal and external knowledge to the organization through greater dynamicity propitiated by the processes of knowledge governance. Thus, it will allow decision makers a guideline to act effectively in the entire organizational process. Given the various challenges that organizations face in order to innovate and remain active in the market, external knowledge becomes fundamental and, consequently, Absorptive Capacity (ACAP) acquires importance, since it is a key capacity to create value from this knowledge. In this context, knowledge governance (KGOV) processes are of fundamental importance. As a possibility for future work, we suggest the realization of empirical studies that address the role of knowledge governance for the absorptive capacity and its impact on organizational performance.

Keywords: knowledge governance, absorptive capacity, absorption of knowledge, knowledge, governance

1. Introduction

The survival and evolution of organizations depend on their adaptability. Unless they change what they offer to the world and the way in which they create and deliver products and services risk their survival and growth prospects.

In this sense, innovations are necessary and when linked to scientific and technological knowledge add value to the production chain and provide competitive advantages (Tidd and Bessant, 2018)

The quest for competitiveness has made changes inevitable in innovative processes and employees are key players in bringing about these transformations. Good management encourages employee participation in innovation processes from conception to implementation (Dover and Lawrence, 2012; Cowie, Sandall and Ehrich, 2013).

Within this context the absorptive capacity (hereinafter referred to as ACAP) arises from the interest of organizations in providing the maintenance of their own business. Aimed by Cohen and Levinthal (1990) as being responsible for the performance of innovation within organizations.

Knowledge governance, (hereinafter referred to as KGOV), in turn, refers to the choice of structures and mechanisms that can influence knowledge processes, seeking the interrelationship between the micro, meso and macro levels, with a strategic focus (Foss, 2009).

KGOV Practices are the next step in coordinating an organization's knowledge efforts. The studies that deal with this subject are embryonic, requiring further study. Its relation with ACAP is necessary due to its importance as a process that feeds the others and also, because it presents few studies in the literature, what makes this study necessary.

The paper intends to investigate if the mechanisms of knowledge governance can in some way potentiate the absorptive capacity and what would be its impact on the global organizational performance.

We carried out an integrative review to identify the current state of the art and the interrelationship between knowledge governance and absorptive capacity, based on the databases of Scopus, Web of Science and Scielo.

2. Absorptive capacity

For the researchers Cohen and Levinthal, (1990); Zahra and George, (2002), ACAP has its important representation in the fact that organizations that have the greatest absorption capacity learn, recognize and integrate external knowledge and leave it ready for use, this happens in an effective way, however, depending on the existing internal knowledge.

In defining the absorptive capacity, the same authors consider the "capacity to recognize the value of new external information, to assimilate it and to apply it for commercial purposes".

Later on, this concept has become more broadly defined by Duarte and Austin (2017) as being the capacity that organizations have while using new knowledge in three sequential ways: (a) recognition and understanding of new knowledge through exploratory learning ; (b) assimilation of new knowledge through transformative learning and (c) use of assimilated knowledge to generate new knowledge through exploratory learning.

In considering that strategies and ACAPs are difficult and complex and often tacit processes, any competitive advantage based on these principles makes copying by competitors impractical (Roszkowska-Menkes, 2018). Another important aspect is that the acquisition of information in one field can facilitate the absorption of other related areas (Cohen and Levinthal, 1990).

Therefore, it is possible to affirm that the absorptive capacity has become an important guideline for the success of the organizations. Their interrelationship and interpenetration with people, processes and technologies, feedback them, creating a new strategy to manage knowledge, reducing the complexities of organizations, raising them to a new level of governance for innovations, generating new niches of market (Picoli and Takahashi, 2016; Zahra and George, 2002).

3. Knowledge governance

Knowledge governance is a thematic breakdown in all fields of knowledge management ('KM'), human resources management, organizational theory and strategic management.

KGOV is based on the hypothesis that knowledge processes, ie knowledge creation, retention and sharing can be influenced and driven through the implementation of governance mechanisms, in particular the formal aspects of the organization that can such as organizational structure, task design, reward systems, information systems, standard operating procedures, accounting systems, and other coordination mechanisms (Grandori, 2001).

Knowledge governance considers how the implementation of governance mechanisms influences knowledge processes. It insists on clear foundations and examines the links between knowledge-based units of analysis, with various governance features and mechanisms with diverse capabilities to deal with such transactions (Foss, 2007).

4. Methodological procedures

We first define the research topic, the question to be answered by the study and the search strategy to be undertaken, with the definition of the database descriptors. Next, we set the inclusion and exclusion criteria, calling this step of data collection.

In the next section, called data selection, we read summaries, keywords and titles of publications. We organize, identify and select the most appropriate studies with the research problem. We conclude with the categorization of the selected articles.

Finally, we analyze, interpret and discuss the results, presenting the review and synthesis of the acquired knowledge and proposing future studies.

4.1 Data collection

Between May and June 2019 we made the selection of the articles to compose the basis of analysis. We divided this initial step into two phases: the first one was to (a) pre-select articles and the second to (b) filtering of these articles.

The pre-selection stage of articles consists of three activities: defining the keywords, defining the database and fetching the articles in the database with the keywords.

The pre-selection of articles begins with the contextualization of the theme, describing how the researchers understand it. This characterization of the theme creates a singularity, since it delimits and particularizes its content. The ambiguity of the understanding of the research theme can provide a deviation from the focus of the research.

For the present study we chose the keywords "knowledge governance" and "absorptive capacity". Through combinations of them get Boolean equation ("knowledge governance" AND "absorptive capacity") From this definition we carried out searches in the database Scopus, Web of science and Scielo.

The search incorporating the title, abstract, and keywords fields, without temporal delimitation, returned only three articles in the Scopus database and 16 in the Web of Science, and no articles in the Scielo database, totaling 19 articles, as shown in table 1

This result is representative of the need to address the interrelationship between the two themes.

Table 1: Artigos brutos selecionados por base de dados

Base de Dados	Qtde Artigos
Scopus	3
Web of Science	16
Scielo	0
Total	**19**

Source: survey data (2019)

4.2 Selection of data

Selection is the stage in which we read abstracts, keywords and titles of publications, organize, eliminate duplicate articles, identify and select the most appropriate studies with the research problem. We conclude this step with the categorization of the selected articles, resulting in 11 articles that will be analyzed and discussed in this study.

5. Results and discussion (data analysis)

Table 2 presents the results of the selected articles.

Table 2: Bibliographic portfolio articles

Nº	Author, title, and year	number of citations
1	Ali, I., Musawir, A. U. and Ali, M. Impact of knowledge sharing and absorptive capacity on project performance: the moderating role of social processes, (2018).	12
2	Diehr, G. and Gueldenberg, S. Knowledge utilisation: an empirical review on processes and factors of knowledge utilisation, (2017).	0
3	Lakemond, N. *et al.* Match and manage: the use of knowledge matching and project management to integrate knowledge in collaborative inbound open innovation, (2016).	19

Nº	Author, title, and year	number of citations
4	Foss, N. J. The Emerging Knowledge Governance Approach: Challenges and Characteristics, (2007).	147
5	Williams, C. and Lee, S. H. Resource allocations, knowledge network characteristics and entrepreneurial orientation of multinational corporations, (2009).	20
6	Bocquet, R. e Mothe, C. Knowledge governance within clusters: the case of small firms, (2010).	20
7	Cao, Y. e Xiang, Y. The impact of knowledge governance on knowledge sharing (2012).	30
8	Chen, L. e Fong, P. S. W. Revealing performance heterogeneity through knowledge management maturity evaluation: A capability-based approach, (2012).	21
9	Huang, M.-C., Chiu, Y.-P. e Lu, T.-C. Knowledge governance mechanisms and repatriate knowledge sharing: the mediating roles of motivation and opportunity, (2013).	31
10	Cao, Y. e Xiang, Y. The impact of knowledge governance on knowledge sharing: The mediating role of the guanxi effect. (2013)	09
11	Muller, R, Gluckler, J., Aubry, M., Shao, J.T. Project Management Knowledge Flows in Networks of Project Managers and Project Management Offices: A Case Study in the Pharmaceutical Industry, (2013).	20

Source: survey data (2019)

Diehr and Gueldenberg (2017) have found as results, in relation to processes, the identification of knowledge assets, KGOV and knowledge coordination, relationship building, presentation of knowledge, trade of knowledge and protection of knowledge. In relation to success factors, they found: capacity of absorption, solution of problems of the client, reputation, rewards, incentives, confidence and reciprocity. Both processes and factors are important to the competitive advantage of organizations. As can be seen, ACAP depends on effective knowledge governance.

Chesbrough, Henry and Vanhaverbeke (2006) corroborate with the aforementioned authors in reaffirming that the entry of open innovation as a new paradigm in organizations has directly and positively influenced ACAP. This can be observed when comparing the settings. Open innovation as a process in which organizations generate ideas and research in an environment external to their own, aiming to improve the development of their products, provide better services to internal and external customers, take advantage of new technologies, increase efficiency and they add value, that is, the intentional use of internal and external flows of knowledge to accelerate their differential in the market to which it is embedded.

There is increasing evidence for the benefits of open innovation, however, little is known about how organizations manage the flow of knowledge. Lakemond et al. (2016) analyzed how to combine the flow of external and internal knowledge from the perspective of two KGOV procedures; project management and knowledge matching. They found that for integration to occur, organizations must adopt ACAP mechanisms. This study concluded that in addition to the precursors of knowledge, open innovation and ACAP have shown to be important for the integration of external knowledge and that, also, the company's choice of governance mechanisms is important for the performance of innovation.

Taking into account the consensus on the benefits of open innovation, there are few open innovation studies that investigate explicit organizational procedures that facilitate ACAP and knowledge integration, mainly because open innovation collaborations are likely to fail in the absence of appropriate organizational procedures (Lakemond et al., 2016).

According to Ali, Musawir and Ali (2018) in their study stated that knowledge governance as well as knowledge sharing are important factors in improving ACAP and the project's own performance. They also affirmed that social processes positively stimulate the relationship between knowledge sharing, project performance and ACAP. They concluded that project-based organizations should invest in the KGOV because it is a system that induces knowledge sharing and therefore motivates the absorptive capacity.

In another project study, Muller et al. (2013) investigated the knowledge flows between project managers and project management office (PMO) members in a pharmaceutical R and D company in China. The results showed that knowledge exchange happens in clusters, where each cluster forms around a member of the PMO, but these members were not identified as the most popular knowledge providers. Instead, the knowledge was asked

to collaborators around the clusters. From this, they created a model for the KGOV involving the levels of the clusters, between the clusters and the bond with the corporate and governance structures of the project.

In this same line of research, Bocquet and Mothe (2010) stated that there are few studies addressing the specificities of knowledge integration at the clusters levels, as well as what role KGOV can play in knowledge management. The purpose of this empirical study with content analysis was to unite the role of cluster KGOV in KG, for which 29 interviews were carried out in French organizations. They obtained as results that the initial common knowledge formation is a prerequisite for the identification and acquisition of external knowledge and concluded that the KGOV is necessary to support the integration of the knowledge among the member firms, being more efficient than a specialist.

The various relationships between KGOV mechanisms and knowledge sharing arouse the interests of researchers, but KGOV issues and processes of knowledge transfer are still few. Thus, the relationships between KGOV mechanisms, motivations to share knowledge and knowledge-sharing behavior are still not fully understood. In this context, a study of 66 multinational organizations stated that KGOV's informal and formal mechanisms have a significant influence on the sharing of knowledge, motivation and opportunities. However, this study also argued that even when employees are encouraged and rewarded to share knowledge, effective sharing of knowledge is not necessarily guaranteed (Huang, Chiu and Lu, 2013).

Focusing on the renewal of strategic organizational knowledge resources, on the dynamic capabilities that sustain competitive advantage, authors Chen and Fong (2012) proposed a maturity model for these capabilities. They adopted hypothesis testing to develop a KGOV assessment framework based on the basic assertions of dynamic capabilities. This model is multidimensional which can only be measured through attributes of organizational knowledge. This evaluation will contribute to the implementation of KGOV mechanisms. They concluded that the feasibility of quantitatively evaluating the development of dynamic capacities is associated with the development of the organization. Also, they pointed out to have little research within this context, mainly in relation to the dynamic capacities.

To better understand KGOV in China's emerging strategic industries and to enhance its "guanxi" networks (network of social, political and organizational functioning of the country), researchers Cao and Xiang (2013) to analyze the impact of KGOV on the sharing of knowledge based on the measurement of the guanxi effect. They concluded that the KGOV does not define how knowledge is managed within organizations and because it has a direct influence on the sharing of knowledge, it plays a fundamental role in the sharing of knowledge and that the guanxi effect is a mediator between KGOV and knowledge sharing, partially when considering the informal KGOV. In addition, Chinese enterprises should strengthen the KGOV to promote knowledge sharing among people and thus strengthen the beneficial effects of "guanxi" (Cao and Xiang, 2013).

According to Williams and Lee (2009) KGOV supports entrepreneurship. They asserted this, based on an analysis of clusters of the American multinationals in their three dimensions of entrepreneurship, conservative growth, aggressive assets and, finally, balanced. Considering multinational organizations as repositories of knowledge and efficient in the transfer of this internal knowledge, more than in the markets, their most striking characteristics to influence the entrepreneurial orientation are related to the internal knowledge network, based on this context, that a firm KGOV supports the process of entrepreneurship.

Concluding the discussion, Foss (2007) considers the KGOV as a structure that interconnects the organizational mechanisms with the knowledge process. It goes on to say that knowledge approaches are key factors in contributing to KGOV, they provide effective organizational and governance solutions.

6. Final considerations

After analyzing the articles we reached a consensus that the absorptive capacity is potentialized when the KGA is present using its mechanisms, be they formal or informal. However, due to few studies, doubts emerge about what are the most appropriate governance mechanisms and how they can favor absorptive capacity and organizational performance. It is true that there are a growing number of articles on human resource management, organizational theory and strategic management that have incorporated knowledge-related governance mechanisms. However, the research conducted pointed to a shortage of publications, or that are still inconclusive.

Absorptive capacity depends on effective knowledge governance. As stated by Foss (2007), there is an obstacle to the true application of this literature, for example, the emphasis on misunderstood "capabilities".

Finally, the studies analyzed, although they indicate the potential for action, are not enough to point out that the relationship between the application of knowledge governance mechanisms favors the absorptive capacity and, consequently, the organizational performance. Thus, it is necessary to deepen by studies that deal with the relationship between the two constructs and their mechanisms in an isolated and empirical way.

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Using Data to Unravel Dispositions in Education

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Abstract: The paper considers how an existing software system, TractIt Education, originally designed to track skill acquisition, can be modified in order to meet demands of professions that view education as needing to go beyond skills to address professional dispositions. Data on skill acquisition can inform decisions and support student progress in professional education. The paper describes how the software system TrackIt Education is designed and being used to track skill acquisition through tertiary study and into professional employment. However, some professional groups are critical of a focus on skills in education. In particular, many in Initial Teacher Education (ITE) view dispositions as being of greater value for teaching professionals than skills, and are attempting to make these dispositions the focus of their developmental efforts. Dispositions and their place in ITE are discussed along with problems with how they are currently applied: the concept of dispositions remains poorly defined and there is little agreement on which dispositions are truly important to professional teachers. Research into dispositions typically involves descriptions of approaches taken by various ITE institutions, with little effort made to link dispositions to teacher effectiveness or student outcomes. The paper argues that problems with definitions need to be resolved in order for progress in this important field of research. Further, problems with application can be resolved by viewing dispositions as broadly equivalent to competencies as defined in seminal business literature: underlying characteristics of people that are empirically linked to skills and performance. The paper considers how adoption of this definition can inform the way that skills data can be gathered in the field of Education, and used in gathering the data needed to support sound identification of dispositions and their use in professional development. The paper considers how the TrackIt Education system could be modified to make this empirical research into dispositions possible.

Keywords: skills, skill acquisition, dispositions, initial teacher education, competencies

1. Introduction

Over the last 5 years Massey University in New Zealand has been developing and using software designed to gather data on skill acquisition while providing students with support and direction as they learn. The software, known as *TrackIt Education*, was initially developed for Massey's Veterinary Science program, where students are expected to learn practice-oriented skills along with relevant theory. This reflects the growing expectation employers have that new graduates will quickly make a positive contribution to work.

Previously, Massey and other similar institutions had paper-based systems for recording students' skills. However, these provided little assurance of quality, were prone to error, and did not allow data to be used to either manage the progress of students or improve the quality of teaching and management. Massey University is currently marketing *TrackIt Education* to similar programs in which a high value is given to definable, practice-oriented professional skills.

Not all disciplines, however, are prepared to focus on skills and knowledge as the basis for workplace performance. Those involved in Initial Teacher Education (ITE) have called for greater emphasis on "dispositions" as opposed to skills and knowledge. However, despite the strong support for the idea that ITE should assess and develop dispositions, there are complex challenges that make this a confusing proposition.

The nature of the complex challenges surrounding dispositions can inform the on-going development of systems like *TrackIt Education*. Presently, the software focuses on the issue of skill acquisition, and this focus is considered sufficient by many of those involved in professional education. Those involved in ITE can be considered sophisticated users of systems like *TrackIt Education*. Their concerns and interests may indicate what will be more widely considered important in the future.

This paper will consider how an understanding of the disposition challenge can inform how *TrackIt Education* can be applied in ITE and teacher professional development and learning (PDL). Firstly we will provide background to *TrackIt Education*, then discuss dispositions and the challenges they present for those involved in professional education. Finally, we will consider how *TrackIt Education* could be used or modified to resolve some of the challenges we have identified.

2. TrackIt Education design

TrackIt Education is a software system developed initially in response to the need within the Veterinary profession for reliable data on the skills that graduates have when they begin work (Weston, Marshall, & Ramsey, 2016). The software allows students to see which skills they need to learn, the standard that needs to be achieved, and who is authorised to "sign-off" that the skill can be performed to the required level (Ramsey, Khan, & Weston, 2017). Thus, students get a clear sense of their progress with skills acquisition (Ramsey et al, 2016).

A key feature of the *TrackIt Education* system is that it can differentiate between levels of skill acquisition. While wording of different levels can be tailored to suit particular skills, typically skills are presented to students with four specified levels:

- Level one: students have completed preparation for a lesson on the skill, having reviewed resources associated with the skill. This could be described as the "know what" level, in that students have learned enough to be able to talk knowledgeably about a skill.

- Level two: students have some experience performing the skill, though not yet to the required standard. It may be that students have performed the skill with assistance or in a simulated environment.

- Level three: students have shown themselves to be personally competent by performing the skill to the required standard. This may mean that the skill was performed under favourable conditions; however, the student will have performed the skill to a specified standard to the satisfaction of an authorised assessor.

- Level four: students have provided evidence that they are proficient. They have shown that they can perform the skill in a variety of contexts and without assistance.

Settings for *TrackIt Education* allow the program administrator to specify for each skill whether students can self-rate on certain levels, and where they need to request sign-off from an authorised assessor. Authorisation of assessors is a way for schools to assure the quality of the process. Schools can determine who they are prepared to authorise to sign off each of the skills they teach.

Amabile and Kramer (2011) have outlined the vital role visible progress plays on the inner life of people at work. A guiding idea behind *TrackIt Education* is that students should be able to see the progress they are making toward completion of program requirements, which includes having those requirements clearly articulated. Further, they will respond positively to support for further progress and interactions that celebrate success and encourage future achievement (Ramsey, Khan, Weston, & Marshall, 2016).

With *TrackIT Education,* skills are signed off only when experts, authorised by institutions whose reputations are at stake, have seen evidence the required level of competence has been achieved. The system provides a knowledge management mechanism, by sharing the basis for judgements about skills amongst users: both students and those authorised to do signoffs. The data produced by *TrackIt Education* can then be used to manage learning processes. Schwerdtle and Bonnamy (2017) argue that big data applications have the potential to revolutionise educative processes, and the *TrackIt Education* system is being designed to allow data to be combined across institutions for this purpose.

3. Dispositions in education

A common model of professional development is the expectation that a new graduate will begin work with a set of skills they will be able to perform from "Day One". Following employment, there is often a pre-registration period in which the aspiring professional shows that they can transfer skills to the workplace and further develop their practice-oriented skills for the particular context in which they work.

Based on a growing body of academic literature related to teacher effectiveness, the education profession has sought to have initial teacher education (ITE) go beyond knowledge and skills and address what have been termed "dispositions" (O'Neill, Hansen & Lewis, 2014). There is widespread recognition that effective teaching is more than a linear one-way process in which a teacher imparts learning to a student using established pedagogical practices. The nature of the relationship between the teacher and the student will influence how much learning takes place.

Consider how such relationships might influence a teacher's use of a classroom management skill such as 'responding to off-task behaviour'. Where the teacher is working in a context of generally well-behaved students and a student with whom the teacher has a positive, respectful relationship, off-task behaviour might immediately change when the teacher skilfully pauses and gives the student a "look" that communicates that the behaviour is unacceptable. This is an important low intrusion strategy that allows behaviour to be managed without disrupting the activity of the class.

In a different context, however, skilled use of a "look" might have little impact. An individual student or the class as a whole might have little respect for the teacher and take pleasure in generating disapproving looks. Teachers who are unsure of their relationships with some students might deliver an ambiguous "look" with little impact. Or a teacher might decide that there is little point using low intrusion strategies with some students; the relationship is such that the teacher chooses not to even employ the skill.

Internationally, this is of particular concern in ITE because of the nature of those who choose to enter the profession. While student populations of schools and classrooms are becoming more diverse, ITE candidates are largely homogenous. Teaching seems to appeal as a profession to white, middle class females (Shandomo, 2010). According to Mills (2008), while teachers may not intend to perpetuate injustice, they frequently do not acknowledge how some students are disadvantaged at school. Teachers may attribute their own academic success, not to any privileged class status, but to their personal effort, and so are likely to see those from other cultures who struggle to succeed as being in deficit (Mills, 2008). Particularly when some in the classroom respond to their skills and achieve learning outcomes with relative ease, when others do not succeed a teacher might quickly "blame the learner" and focus their effort and skill where they achieve visible results.

Literature on dispositions attempts to clarify what attitudes, values or practices incline some teachers to assume that all learners are capable of learning (Villegas, 2007). Rather than persist with practices that have worked in other contexts, teachers with the right disposition will attempt to adapt their practice to the new context in which they find themselves. Further, rather than allowing the responsiveness of the students to be the basis for a positive relationship, a teacher with the right disposition will attempt to build positive relationships with all students.

This understanding of dispositions encourages those working in ITE to aim for "adaptive" rather than "routine" expertise; the capacity to operate skilfully in the context of changing demands (Carbonell et al, 2014). This can involve selecting ITE candidates on the basis of "pre-dispositions" that make them better able to take the desired approach (Jung & Rhodes, 2008); modelling dispositions in how ITE is undertaken (Mills, 2008); ensuring graduates understand the role dispositions play in their practice (Splitter, 2010); and selecting mentor teachers and university supervisors on the basis of their ability to model required dispositions (Mills, 2012). Interestingly, educational literature tends not to suggest that assessment of dispositions should be used in determining whether students qualify to graduate (O'Neill, Hansen & Lewis, 2014).

A range of beliefs, personality traits and behaviours have been suggested as dispositions associated with superior teacher performance. These include the belief that all students can learn (Welch et al, 2010), attitudes to cultural diversity (Dee & Henkin, 2002); capacity for reflection (Giovannelli, 2003); beliefs regarding social justice (Mills, 2008); and qualities such as enthusiasm, leadership, respect and self-confidence (Young & Wilkins, 2008).

4. Problems with dispositions

There are some serious challenges facing those who wish to incorporate dispositions in ITE. Firstly, there are important tensions associated with the use of dispositions for selection of candidates to train as teachers. On the one hand, assuming that dispositions are relatively stable or fixed suggests that it is wise to select those who already demonstrate they have appropriate dispositions and thus avoid producing graduates who are poorly suited to teaching. On the other hand, some take the view that it is be dangerous to assume that dispositions are fixed, given that those in ITE need to model the dispositions they teach, including the belief that all students can learn. Those in ITE who do not manage this tension risk falling short of professional expectations regarding ethical practice in teaching (O'Neill, Hansen & Lewis, 2014). To avoid such accusations those in ITE need to focus their efforts on developing dispositions, taking a growth mindset to the challenge (Dweck, 2006).

Developing dispositions, however, is also a challenge. While there is broad agreement in ITE about the importance of dispositions, there is not yet a shared understanding of how dispositions are best defined, how they may be identified, or which dispositions contribute to effective teaching (Freeman, 2007). Borko, Liston and Whitcomb (2007) have summarised the debate taking place in education. Some view the lack of an agreed-upon definition as an impediment to any real progress in the field. Others take the view that lack of agreement signals the need for more work to develop reliable and valid measures.

In their review of academic educational literature on dispositions, O'Neill, Hansen and Lewis (2014) found very little empirical research in the area, whether attempting to link dispositions with teacher effectiveness, or dispositions with student outcomes. Rather, research literature on the topic is mostly written by teacher educators, describing the approaches taken in particular ITE programmes. The authors concluded their review by suggesting that identification of precise indicators of dispositions, assessment methods, and development process may take years to develop effectively and it is worth exploring whether a collaborative approach across institutions would be more helpful than the current "trial and error" approach being adopted internationally by individual institutions.

Research into dispositions in education seems to mirror the early situation in Organisational Learning, where a review by Lahteenmaki, Toivonen and Mattila (2001) concluded:

> *"…one cannot avoid the feeling that little has been done to develop valid measures…This might be due to, but also the reason for, a striking lack of comprehensive empirical research in this area. Another reason for the shortage of methodological discussion and the under-development of measures…is the fact that the very concept itself is vague. It is of course impossible to measure the phenomenon without knowing what it is." (p.114)*

Clearly, more work is needed to produce an agreed approach to defining dispositions and developing measures that can form the basis for empirical research. Skills data produced by *TrackIT Education* might provide a basis for this work, though it would require some modification to how the system is currently applied. Further, it would require an approach to defining dispositions that embraces rather than rejects the role of skills as part of ITE.

5. Reconciling skills and dispositions

Some take the view that a focus on skills will result in ITE taking only a surface level approach to preparing graduates for professional work. Others view dispositions as too vague to provide a meaningful direction for ITE. Rather than taking this "either/or" approach, it is worthwhile considering how skills and dispositions could work together to form a more complete approach to ITE. The current lack of agreement on a definition of dispositions creates the opportunity to conceptualise them in a way that makes reconciliation possible. Reconceiving the nature of dispositions could also enable them to be incorporated into ITE with greater validity. To do this, it is useful to view dispositions as the equivalent of 'competencies' as described in the seminal work of Spencer and Spencer (1993).

Figure 1: Competency causal flow model

Spencer and Spencer (1993) define a competency as an underlying characteristic of an individual that is causally related to effective and/or superior performance in a job. Similarly, dispositions are described in education literature as underlying characteristics associated with superior performance. The extra element to the definition of competencies is that they are *causally related* to performance. In other words, competencies are, by definition, established by empirically proving a causal link between the characteristic and performance. Whether the characteristic is a value, trait, or attitude is not as important. A characteristic that does not predict anything meaningful in the real world is not to be considered a valid competency.

Taking this approach could give much greater clarity to a definition of dispositions. However, it requires that those involved in disposition research have access to data that can used to establish such a causal link. Another aspect of competencies discussed by Spencer and Spencer suggests the type of data that is appropriate. Competencies predict whether an individual can perform skilled actions, and these skilled actions in turn predict

job performance, as shown in Figure 1. Thus, data on skills provides an important link between competencies, or dispositions, and desired performance.

As indicated by the Spencer and Spencer definition, competencies and skills can predict either effective performance or superior performance. Effective performance is that when an individual does enough to meet the requirements of their job. In the context of New Zealand education, effective performance is, in practice, the ability to gain and maintain professional certification, based on the standards established by the New Zeland Education Council. Superior performance is that when an individual is able to perform at a demonstrably higher level than the norm for the profession. Empirically, this means performance that is one standard deviation above that of the population as a whole. In the education context, this can translate into those teachers who are judged to be in the top 10 percent of their professionally certified colleagues. *TrackIt Education* makes it possible to establish what constitutes each of effective and superior performance, doing so on the basis of skills.

The New Zealand Education Council has defined professional certification largely on the basis of dispositions, including a teacher's commitment to the teaching profession, to learners and their families, and to society. These commitments are underlying characteristics that are expressed through skilled action. For instance, in the cultural context of New Zealand, an important way that a commitment to learners' families can expressed is by acknowledging family members when they enter a classroom. It takes skill to do this in a way that is viewed as respectful by the family member—who may be from a different cultural background to the teacher—and is done in a way that contributes to, rather than undermines student learning taking place in the classroom. This skill, which is not directly associated with classroom pedagogy could be considered an 'indicator' of the 'commitment to family' disposition.

Dispositions associated with effective performance can be represented in *TrackIt Education* in several ways. Firstly, to include sufficient indicator skills to provide assurance regarding the existence of the disposition. As is the case in all professional education, it is not possible to teach everything a professional will need prior to graduation. Some skills will always need to be learned on the job. On-going professional development is expected throughout a career, so ITE providers need to determine the extent to which students' time and effort needs to focus on acquiring skills, balanced against the need to study relevant theory.

Secondly, ensuring that the standards for skills directly related to teaching practice are expressed in a way that reflects a range of commitments or dispositions. The way standards are expressed can be relatively broad when skills are signed off by an authorised expert who is able to bring tacit knowledge of competencies to bear when judging the level at which a skill has been performed (Ramsey, Khan, & Weston, 2017).

Thirdly, requiring skills to be signed off more than once, perhaps requiring them to be performed several times in a variety of contexts. Contexts might involve working with students of varying ethnicity or groups that vary in terms of diversity. *TrackIt Education* can require sign-off multiple times, and students can be required to provide evidence in support of a request for sign off. That evidence can include critical reflections related to the various situations in which the skill was performed. Critical reflection is viewed by the Education profession as a basis for on-going learning that reflects the desired disposition.

Finally, ensuring that those authorised to sign off skills are professionals who personally model the commitments expressed in the code of professional responsibility.

Data on superior performance can also be gathered using *TrackIt Education*. Rather than limiting skill sign off to the standard four levels, a fifth level of 'Superior Performance' can be included in the system. Schools employing sufficient numbers of teachers can be authorised to sign off those whose ability to employ skills to achieve important outcomes puts them in the top 10% of the school. Identifying superior performers creates a benchmark for empirical studies of potential dispositions.

In the context of education, the *TrackIt Education* levels presented earlier in this paper could be modified as follows:

- Level one: *Ready for learning*, having completed preparation for a lesson on the skill, having reviewed resources associated with the skill.

- Level two: *Emergent competence*, having some experience practicing the skill, or with the assistance of a professionally competent colleague.

- Level three: *Personally competent* having performing the skill to the required standard, in favourable conditions (e.g. with students who have a pre-existing positive relationship).

- Level four: *Adaptively proficient*, having performed the skill to the required standard in a variety of contexts, including those that are culturally challenging, with critical reflections provided.

- Level five: *Superior performance*, having consistently used the skill in a range of conditions to achieve results that put the performer in the top 10% of professionals in the school.

TrackIt Education was designed to provide student users with valuable information on their progress toward their learning goals, while at the same time generating information that could be used at an institutional level that would help manage the learning process. Used in the way described above, *TrackIt Education* would do continue to support student progress while also addressing dispositions. Student users would be given a clearer indication of how they need to demonstrate the dispositions required by the profession. At the same time as they used the system they would produce the big data needed by academics and professional organisations to test whether the dispositions currently in use are really those associated with effective or superior performance in real world settings.

6. Conclusion

All academic disciplines develop their own cultures: beliefs and assumptions about how work should be done and what types of work are of greatest value. These cultural differences are reflected in attitudes educators have toward the place of skills in professional education. Disciplines associated with natural sciences, such as Veterinary Science, have recognised the need to incorporate practice-based skills into tertiary education. Literature in the field of Education has expressed the view that professional education should address more than skills. As has been discussed in this paper, the disposition of professionals is believed to have a powerful influence on their practice, and therefore needs to be a focus for those working in the area of initial teacher education (ITE).

Those working in ITE have sound reasons for prioritising dispositions, the underlying characteristics that shape how people approach their work. Because educational outcomes necessarily depend on the quality of relationships between teachers and learners and relationships are strongly influenced by the personal characteristics of those involved, addressing these characteristics or dispositions is reasonable. Further, the international context of education gives added reason to attend to dispositions: candidates seeking to enter the teaching profession tend to be homogenous where the students they are teaching are becoming more diverse.

It is easy to take an 'either/or' approach to differences between disciplines. Either skills are important or they are not. Those in ITE are either right or they are wrong. Either dispositions are a waste of effort or they are important.

Those involved in the design of *TrackIt Education*, software that tracks the acquisition of practice-based skills, are likely to find it easier to work with those in disciplines that emphasise 'hard', observable skills that are directly linked to practice. Addressing issues raised in relation to dispositions seems to call into question the value of software that currently works best with practice-based skills. Also, given the current confusion surrounding the definition of dispositions and disagreements on how they can be identified, it is easy to dismiss the issue as peripheral to more serious disciplines and professions.

Rather than take an 'either/or' perspective on the debate, progress can be made in developing the system by recognising how skills and dispositions can work together to generate better outcomes, both in terms of the quality of professional education and the performance of people at work.

Skills are more readily observable than dispositions; expert practitioners can assess the skilled actions of learners. Skills thus provide a basis for gathering valid and reliable data. Dispositions or competencies are a point of high leverage when it comes to professional development. Effort that results in a positive change to key underlying characteristics of a professional can have an impact on the way a range of skills are used in practice. Further, dispositions are of little value to professional unless they are expressed through skilled behaviour. Skills and dispositions are thus complementary to one another.

Identification of dispositions and competencies needs to be the considered an important use of the skills-based data generated by *TrackIt Education*.

Currently, the view that dispositions or competencies are an essential part of professional education may be limited to those in the discipline of Education. Rather than view those working in the Education discipline as difficult or demanding, it is worthwhile thinking of them as sophisticated, even far-sighted. By responding to the challenge presented by ITE, data gathering efforts can prepare to meet the needs of other disciplines that in the future see the need to address deeper, underlying characteristics of those working in their professional communities.

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Interdependence of Intellectual Capital and Interorganizational Relations in Empirical Research

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Abstract: The globalization processes have sparked an increased interest among scholars in the role of intellectual capital in building brand identity and brand positioning in the market. The relationships found in the modern global economy are based particularly on resources such as the organization's manager and employee knowledge. A modern economy and its network of connections also relies immensely on the mutual interactions between independent entities and the relationships they create. In today's economic reality, all businesses continuously look for measures and instruments that would allow them to prosper successfully. The key to success comes in the form of intellectual capital. This intangible value of any business develops along interorganizational relations and the two are currently considered to be one of the key trends in enterprise development. The aim of the paper is to identify and demonstrate the role of interorganizational relations and intellectual capital in enterprises on the basis of their growth. The research problem concerns the extent to which intellectual capital affects the type of interorganizational relationships. The paper discusses the empirical research that was conducted between 2014 and 2018 in various businesses located in Poland (in the region of Podkarpacie) and in Georgia (the region of Mtskheta-Mtianeti and Tbilisi). The main hypothesis adopted for the empirical research stated that Interorganizational relations contribute to the creation of intellectual capital and to the improvement of companies' innovativeness, which results in the company's overall development. It was important to indicate the determinants of interorganizational relations and intellectual capital that affect the development of the surveyed enterprises. The research determined the intensity and the degree of cooperation between the enterprises and external entities in acquiring knowledge and information. The research also examined the relationships between them. The assumption was that the intensification of cooperation between businesses would bring a number of benefits and would help strengthen their market position. As a result of the research, a model of interdependence between the interorganizational relationships and the impact of human capital in a changing environment was constructed. It examined and presented 12 factors influencing the development of an organization - blocking and driving factors, and common factors that can be both stimulants and determinants conducive to development in a changing environment.

Keywords: intellectual capital, interorganizational relations, success of organization, development in organization

1. Introduction

In the age of globalization, the processes of the modern economy have increased interest and directed the attention of scientists to the role of intellectual capital in creating and achieving market position by enterprises. In the conditions of growing competition, only enterprises that aim to continuously improve their position through proper management of their intellectual capital, especially human capital, stand a chance for development and survival. Employees as well as their skills, knowledge and competences are treated as the basic source of achieving market advantage.

2. The essence of human capital

The early 1980s saw the beginning of the history of intellectual capital management. It was then that managers and consultants came to realize that their intangible assets are often the main source of financial results (although scientists had understood it as early as the 1940s) (Fazlagić, 2010).

Finding a coherent definition of the intellectual capital, both theoretically and practically, poses a challenge. It is associated with a fairly wide group of terms, which makes its operationalization difficult. Several dozens of different definitions of this concept can be found in the literature as shown in Table 1.

Table 1: Definitions of intellectual capital

Authors	Intellectual capital definition
R. Hall (1992)	May be classified as "assets" (e.g. brand, trademark, contracts, databases) or "skills" (e.g. know-how of employees, organizational culture
L. Edvisson, P. Sullivan (1996), A. Brooking (1996)	Knowledge that can be converted into value Consists of four main components: market assets, human-centred assets, intellectual property assets and infrastructure assets

Authors	Intellectual capital definition
K. E. Sveiby (1997)	Consists of three categories of intangible assets: internal structure, external structure and human competence
J. Roos *et al.*(1997)	It is composed of a thinking part, i.e. the human capital, and a non-thinking part, i.e. the structural capital
T. A. Steward (1997)	Intellectual material that has been formalised, captured, and leveraged to produce a higher-valued asset
L. Edvisson, M. S. Malone (1997)	It is the sum of human capital and structural capital. It involves applied experience, organizational technology, customer relationships and professional skills that provide an organisation with a competitive advantage
N. Bontis et al. (1999)	It is a concept that classifies all intangible resources as well as their interconnections
B.Lev (2001)	Sources of future benefits (value), which are generated by innovation, unique organizational designs, or human resource practices
B. Marr, G. Schiuma (2001)	It is composed of all knowledge-based assets, distinguished between organizational actors (relationships, HR) and infrastructure (virtual and physical)

Source: own study on the basis of B. Marr, G. Shiuma, A. Neely, Intellectual capital – defining key performance indicators for organizational knowledge assets, Business Process Management Journal Vol. 10 No. 5, 2004 pp. 551

Most authors agree on the fact that intellectual capital shares the following characteristics: - it is knowledge-based, - it is a structured combination of intangible resources (their ordered and conscious dimension), - bridges the gap between the perception of the market value of the company and its representation in traditional reporting systems, - properly used, it provides the company with the means for competitive advantage on the market; - relies on the specifics of a given organization, - its size, the nature of the business, sector or area in which it operates, the image and quality of its intellectual dimensions.

The difficulty in establishing a whole and unambiguous definition of the concept also stems from the fact that Intellectual capital can understood at the individual level (intellectual capital of a human) and group level (intellectual capital of groups and teams of employees) and the organization as a whole of entities.

The main role in creating the company's intellectual capital is attributed to the employees, who constitute the strategic resource of the company (Borowiecki et al., 2018) and are increasingly deciding on the economic performance of enterprises. Various definitions are used to describe intellectual capital, although their general pronunciation does not show major differences due to the wide scope of this concept.

For the purposes of this article, the authors focus on the intellectual capital of an organization, and are aware that the process of shaping it relies heavily on the effects of employee efforts (both individual and group) but also on the values brought into the organization through networks of relationships and economic connections.

3. The essence of interorganizational relations

Nowadays, interorganizational relations between independent entities are one of the most important development trends in contemporary mechanisms of shaping the competitiveness of enterprises (Castels, 2000). When we analyze the source in the field of management and organizational theory, we will see a variety of concepts showing the significant impact of collaboration between organizations. Such collaborations tend to take the form of cooperation, network management, project management, works on new organizational forms such as clusters, partnerships, interorganizational networks or strategic alliances. Therefore, interorganizational relations can be considered as one of the most important categories in management sciences (Borgatti and Cross, 2003).

In turn, the organizational practice shows that the interorganizational relations have become a ubiquitous phenomenon in the business reality. At the same time, these relations include both cooperation between enterprises, relations between companies and public sector entities, cooperation between public entities, relations between enterprises and non-governmental organizations, couplings between public entities and non-governmental organizations, and finally, cooperation between non-governmental organizations themselves.

Structure of the organization has a significant impact on the development of relationships with the environment, which is quite widely described by H.J. Leavitt, in particular, interorganizational relations. In practice, many

different types of relationships between market economy entities can be indicated. According to J. Mohr and R. Spekman, these relations can be described as "purposeful, strategic, occurring between independent companies that achieve compatible goals, strive for mutual benefits and accept a high level of mutual dependence" (Mohr and Spekman, 1994). In turn, M.D. Hutt and T.W. Speh are of the opinion that this process refers to the relations of cooperation, as a result of which, with the passage of time, the participants of agreement develop extensive and stronger social, economic, technical and service ties to achieve mutual benefits (Hutt and Speh, 1997).

When analyzing the concept of interorganizational relations, it is necessary to emphasize the necessity of shaping connections between individual links on the principles of trust and division of risks and benefits. Such a relationship leads to the appearance of additional synergistic effects and, as a result, to achieve a competitive advantage (Witkowski 2003).

At present, interorganizational relations are considered an increasingly important source of competitive advantages and profitable results (Grandor 2012; Dyer et al., 1998). In this sense, interorganizational relations can be understood as a multi-subject action aiming at achieving mutually consistent goals (Möller and Svahn, 2003).

What is certain is that the process of giving up the classic organizational structures based on the traditional division of functions and power in favor of the development of interorganizational relations, remains significant for contemporary economic reality (Rzepka, 2018). Obviously, this is the effect of the increase in the importance of intangible factors in management. The rate of changes in the organization, which in turn is the result of the impact of an unpredictable and turbulent environment, has also become more and more important. Success in managing the interorganizational relations (Olesiński et al., 2016) lies in taking into account the autonomy of participants functioning in the network and ensuring the coordination necessary for their proper cooperation.

4. Methodology and research sample

The issues of interorganizational relations and intellectual capital are discussed on the example of enterprises from two regions: Poland and Georgia. It was very important to indicate determinants of the relationship and intellectual capital that affect the development of the surveyed enterprises as empirical research is the basis for indicating these elements.

As part of the four-year project "European Experience for Georgia[1]" the research was carried out aimed at deepening the knowledge on the impact of interorganizational relations on the development of micro and small enterprises. The research covered 200 business environment institutions (associated in the Georgian Chamber of Industry and Commerce, that cooperates quite intensively with universities, including TSU, GTU) - enterprises operating in Georgia (from the areas of Mtskheta-Mtianeti and Tbilisi), which is the equivalent of the province in Poland. The research was divided into stages: stage I included pilot studies in 2013-2014, and stage II - proper research performed in 2015-2017. These studies were reproduced in 2017 to verify applications and indicate the main development directions and attitudes present in interorganizational relations.

Research in Poland was carried out among Podkarpackie MŚP sector enterprises within the cluster of the Aviation Valley and the Business Council operating at the State Higher Technical and Economic School (PWSE) in Jarosław, which have conducted activities in the above-mentioned province. The study included only those companies that agreed to participate. The surveyed enterprises were divided into several types (micro, small, medium and large).

The research, both in Poland and Georgia, was carried out by applying the principles and standards developed by OECD - Development Assistance Committee - Network on development evaluation. Bearing in mind the requirements and general purpose of conducting a reliable study, the author has assumed the implementation of the entire study using many methods and research techniques. As a result, triangulation of methods and

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[1] Selection of research in the regions of Georgia is mainly due to several years of cooperation with Agnieszka Rzepka. The author collaborates for over 6 years with Javakhishvili Tibilisi State University. As part of this cooperation, she conducted a series of lectures as part of two- and three-month internships. The author conducted pilot studies as part of the project "European Experience for Georgia" together with Javakhishvili Tibilisi State University, Innovation Management Center, Georgian Technical University, Venture Business Center in 2012-2015. The research was also aimed at increasing the local cooperation, including first of all, enterprises, integration of entrepreneurship-related environments, strengthening correlations between the enterprises themselves and the institutions surrounding them, the academic and advisory environment, intensifying pro-innovation activities in the small and micro sectors.

techniques was guaranteed, both in the area of data collection, as well as their analysis and formulation of conclusions. In the course of the research, 1) desk research; 2) individual in-depth interview; and 3) surveys with selected group of people, were performed.

In order to analyze the obtained data, statistical method - Pearson $|^2$ (chi square) test for independence of features - was used. Statistical analysis of data obtained from the survey was carried out using the SPSS STATISTICS 21 computer package. The type of questions and categories of answers in the questionnaire determined the qualitative nature of the variables analyzed. For this reason, results of the interview were presented in this work as a percentage, and the non-parametric independence Pearson $|^2$ test (Zeliaś et al., 2002) was used to assess interrelations between studied features.

With this test, the null hypothesis (H_0) was verified, claiming that two features are independent, against the alternative hypothesis (H_1) that these features are dependent. In order to check the reliability of questions regarding the surveyed enterprises, the Alfa Cronbach test was carried out. The above tests allow to determine, for which variables there are statistically significant dependencies.

The optimal solution was to select a few key indicators of human capital, interorganizational relations that refer to measurement at the enterprise level, and which take into account the most important aspects of the company's operations. Their selection was also determined by the possibility of obtaining empirical data from enterprises.

The following definitions have been adopted for research and subsequent analysis of research objectives:

- **interorganizational relations** are all connections that appear between specific entities leading to a long-lasting business strategy,

- **intellectual capital** is the combined knowledge, skills, abilities and innovativeness of individual employees of the company for the efficient performance of tasks.

For the needs of the research (Georgian companies vs. Polish companies), the Pearson χ^2 test has changed as follows:

$$\chi^2_{obl.} = \sum_{i=1}^{r} \sum_{j=1}^{k} \frac{(n_{ij}(a+b) - \hat{n}_{ij}(a+b))^2}{\hat{n}_{ij}(a+b)}$$

where:
n_{ij} – empirical population (observed)

$\hat{n}_{ij}$ – expected population (theoretical)

a – Polish companies

b – Georgian companies

Whereas the formula for Pearson straight-line correlation coefficient for the study of enterprises from two areas took the following form:

$$r = \frac{\sum_{i=1}^{n} x_i y_i - \frac{\sum_{i=1}^{n} x_i \cdot \sum_{i=1}^{n} y_i}{n_{(a+b)}}}{\sqrt{\left[\sum_{i=1}^{n} x_i^2 - \frac{(\sum_{i=1}^{n} x_i)^2}{n_{(a+b)}}\right]\left[\sum_{i=1}^{n} y_i^2 - \frac{(\sum_{i=1}^{n} y_i)^2}{n_{(a+b)}}\right]}} \cdot g$$

where:

n – population of surveyed companies
a – Polish companies
b – Georgian companies
g – development
x_1y_1 – value of random samples of i-th variables (i = 1,2, …, n)

Next, the null hypothesis about the irrelevance of the straight-line correlation coefficient in general population "p", was verified, i.e. hypothesis that there is no significant difference between the absolute value of the coefficient and value 0:

H_0: $p = 0$

The above statistical analysis was necessary to evaluate the results and effectiveness of the conducted tests. Based on the above studies, results can be presented with statistical models included.

The following main hypothesis [MH] has been adopted for empirical research: *Interorganizational relations contribute to the creation of intellectual capital and to the improvement of companies' innovativeness, which results in the company's overall development, including micro and small ones, which leads to their development*, and the partial hypothesis [HO1] which states that *Institutionalization is favored by the institutionalization inter-organizational relationships by creating a network of inter-organizational relationships*.

5. Research results

On the basis of the conducted research, it is worth paying attention to several areas affecting the relations between intellectual capital and between organizations. First of all, we assume that the surveyed companies cooperate with each other. But, will there be obstacles or factors that affect the shape of these relations?
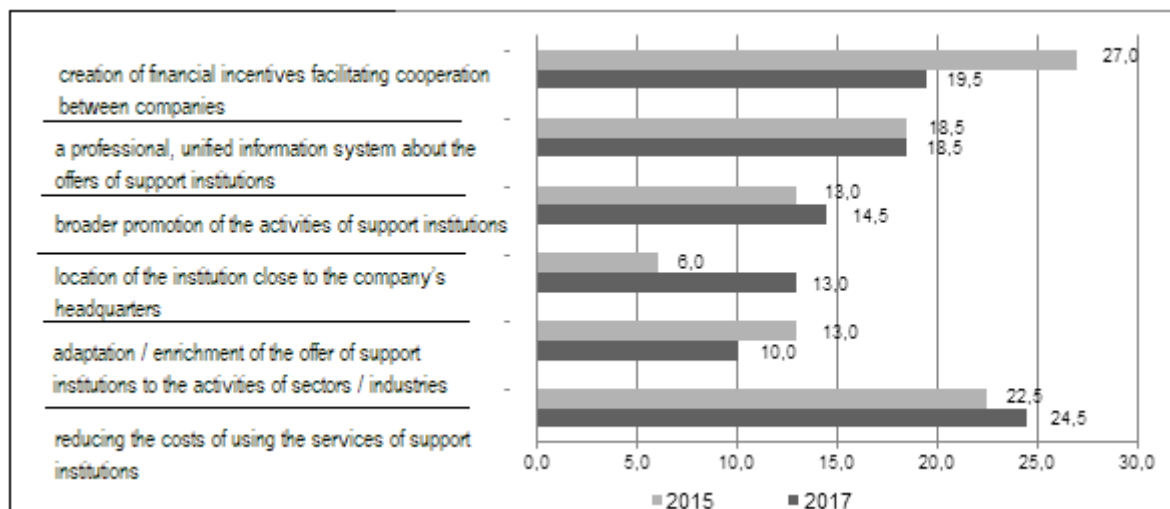
* P > 0,05, df = 5, $|^2$ = 8,694 – not statistically significant dependence
Source: Own study based on research (Rzepka, 2018).

Figure 1: Factors that can improve cooperation between organizations, N=400 (w %)*

As shown in Figure 1, factors that could improve cooperation between enterprises and results obtained in the analyzed years turned out to be at a very similar level. The responses that differed most in terms of factors that could improve cooperation between organizations were: creation of financial incentives facilitating cooperation between companies (decrease by 7.5%) and location of the institution close to the company's headquarters (increase by 7 percentage points).

On the basis of the above-mentioned factors, it is worth analyzing the relations present in a company and outside. As indicated in Figure 2, the obtained results are at a very similar level and are in the range between 4.59 and 5.14, therefore, in the case of none of the variables we cannot talk about the presence of statistically significant relation. It is worth noting, however, that Polish companies are more convinced of the validity of the aforementioned claims, as compared to Georgian ones.
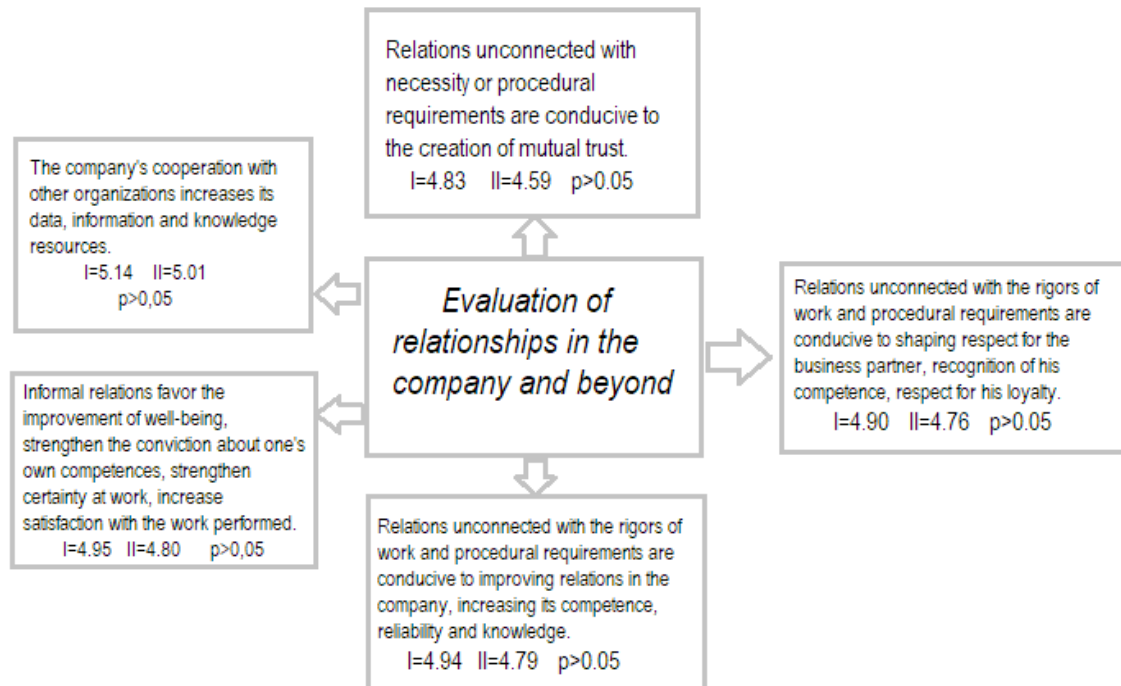
* I – companies from Poland, N=202, II – companies from Georgia, N=202
Source: Own study based on research (Rzepka, 2018)

Figure 2: Model for assessing relations within a company and outside*

Based on the model presented below (Figure 3), we can observe significant differences in the activities of Polish and Georgian companies. Respondents could use a seven-point scale, where 1 meant no cooperation and 7 cooperation once a week. Values that have been obtained ranged from 1.33 to 3.54, which means that this cooperation is either negligible or not more than several times a year. As we can see, Polish companies most often undertake cooperation with other enterprises and consulting companies. In turn, companies based in Georgia most often cooperate with a government agency and other enterprises. It is worth noting that for all variables, we can talk about the presence of statistically significant dependencies.

As can be seen from the figure, Polish enterprises cooperate with statistically significantly more companies and research centers compared to Georgian companies. Enterprises from the analyzed Georgia, in turn, cooperate on average with 2.34 government agencies, in comparison to 1.84 government agencies from Poland. Again, we can talk about the existence of statistically significant dependencies and respondents working in Polish enterprises more often cooperate with all types of organizations, with the exception of government agencies, with which Georgian entrepreneurs declare more frequent cooperation.

It is worth paying attention to the issue related to achieving success by the organization. What affects the achievement of significant market positions? In a survey conducted in 2017, considerably smaller percentage of respondents believed that the factors blocking the organization's success were bureaucracy, corruption and imperfections of the banking system, compared to 2015. In turn, larger percentage of respondents saw these barriers in the lack of capital, infrastructure imperfections, unsatisfactory cooperation with the business environment and geographical location. In most cases, we can notice statistically significant dependencies.

In the course of research (Rzepka, 2018), 12 factors influencing the development of the organization were formed, i.e.: type of sector, territorial scope of activity, competitive advantage areas considered as innovations and implementation of technologies. In addition, attention was paid to the financial condition, the use of financial support, priorities for future activities, as well as to problems, i.e. the use of external funds or problems dependent on legal aspects.
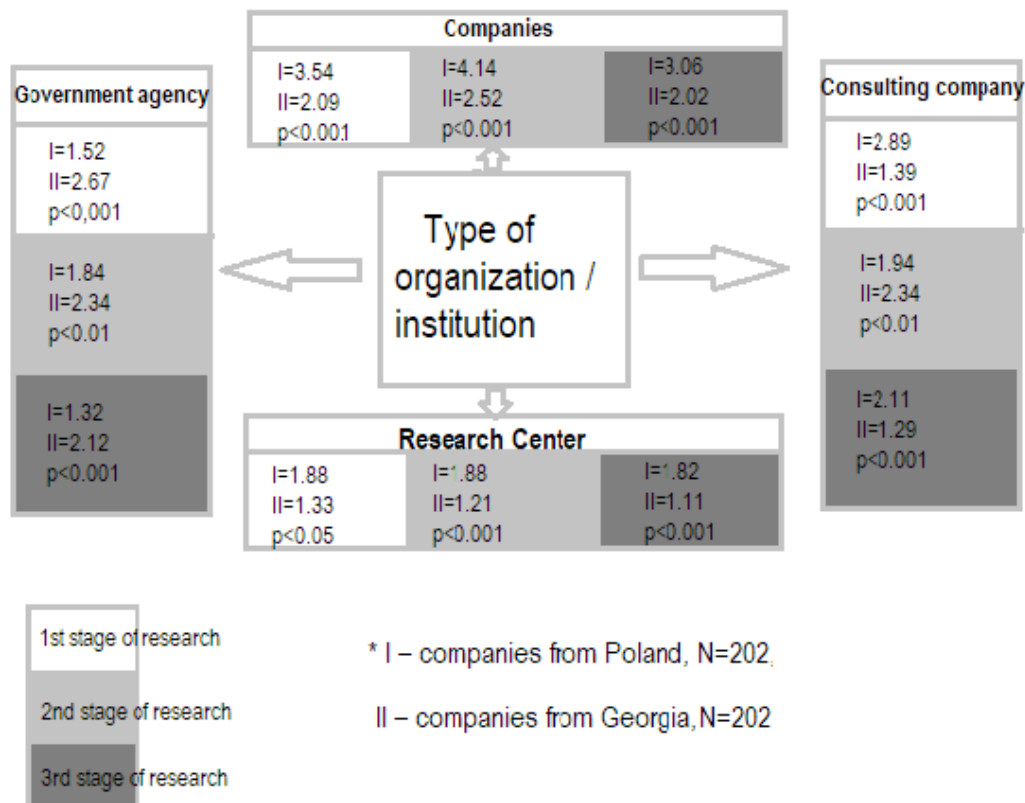
Source: Own study based on research (Rzepka, 2018)

Figure 3: Model illustrating the frequency of cooperation between the surveyed companies and other organizations/institutions *

Table 2: Average rating of factors blocking the organization's success, N=400 (on a scale from 0 - negative, up to 4 - positive)

Types of needs	Year of research	
	2015	2017
Bureaucracy **p > 0,05**	1,88	1,11
Corruption **p < 0,01**	1,33	0,72
Imperfection of the banking system **p < 0,001**	2,31	1,13
High taxes **p > 0,05**	2,87	3,14
Lack of capital p < 0,001	2,51	3,28
Lack of qualified staff **p > 0,05**	2,08	2,34
Imperfect infrastructure p < 0,001	1,91	3,02
Unsatisfactory cooperation with the business environment p < 0,001	1,76	3,39
Geographical location p < 0,01	1,48	1,82
Telephone orders **p > 0,05**	0,92	0,73
Other **p > 0,05**	1,01	1,22

Source: Own study based on research (Rzepka, 2018).

Identification during the research confirmed the occurrence of all these factors, assuming a variable environment.

Research has confirmed that both blocking and driving factors can be the same. On the basis of the repeatability of the research, blocking factors as well as those that support development of enterprises are indicated.

However, it is worth pointing out that the development is influenced by common factors, i.e. factors that can be both stimulants and determinants conducive to development in a changing environment.

Table 3: Factors influencing the development of the organization

Driving factors	Blocking factors	Common factors
- having a long-term development strategy, - using financial support, - areas of support for enterprises, - priorities for future actions	- barriers to development, - competitor advantage areas (considered as the implementation of innovation and technology), - factors dependent on legal aspects - problems in using external funds	- financial condition, - territorial range, - main field of activity - type of sector - changes in employment

Source: Own study based on research (Rzepka, 2018)

Many years of empirical research (Rzepka, 2018) and a thorough analysis of available documents and subject literature lead to the conclusion that enterprises in different countries, with different levels of development and in different regions of the analyzed countries, develop in a similar direction, although at different rates and in different range. The research confirmed the hypothesis that Interorganizational relations contribute to the creation of intellectual capital and to the improvement of companies' innovativeness, including micro and small ones, which leads to their development. Therefore, one can speak about manifestations of processes and management tools in specific enterprises.

The concept of intellectual capital is receiving greater interest among entrepreneurs, even if their willingness to create intellectual capital varies depending on the conditions of the functioning of a given enterprise (Rzepka, 2019). In general, it manifests itself more in creative enterprises, such as consultancy, research, programming, etc. - more in highly developed countries. Similarly, the development of interorganizational cooperation is facilitated in the developed countries and developed regions of these countries.

Research has shown that defining intellectual capital and its impact on the type and form of interorganizational relations in the surveyed enterprises is verifiable, while solving the research problem regarding the degree of intellectual capital impact on the shape of interorganizational relations is quite difficult.

On the basis of empirical research, it can be stated that in developed countries, up to 20% and more enterprises focus to a large extent on interorganizational cooperation and growth of intellectual capital creation. In countries with lower level of development, this make up a dozen or so percent of all enterprises, including mainly innovative, consulting, advisory, design, editorial offices, cultural institutions, etc. while in Georgia only 12% (Rzepka, 2018).

6. Conclusions

The research results described above has led to the devising of a model of interdependence of interorganizational relations and the impact of human capital of an enterprise. Such interdependence is based on the assumption that the potential possessed by an enterprise conditions obtaining a certain advantage. According to this model, the potential of the surveyed enterprises is created mainly by intellectual capital resources owned by enterprises and used to build, maintain and strengthen their competitiveness. In order for enterprises to achieve the advantage that provides the basis for creating and applying instruments to compete in the long run, companies properly shape their potential through the development of human capital, positive relationships and cooperation, investing in modern systems, introducing new products, obtaining patents, purchasing licenses, etc. After applying competitive market instruments (Rzepka and Bojar, 2016) and facing the competitors, they achieve a certain competitive position.

As with other models, it should be remembered that the use of adopted models - especially capital and interorganizational relations - should be characterized by a certain degree of flexibility depending on the operating conditions of a company. The research results show that the impact of the industry on the size of employment partially differentiates the state of intellectual capital management in small enterprises. According to the opinion of Cooper and Kleinschmidt (2007), the model should be considered as a template or road map, not a set of formal processes that should be strictly observed. In addition, knowledge about what constitutes the essence of relations and capital and how it is used in enterprises (Rzepka, 2017) can give the opportunity to better manage, allocate resources in enterprises and control their attractiveness on capital markets. In particular, the obtained results make it necessary to construct a measurement model in the future, used to assess the use of these relations and capital, for example by companies of various sizes, various sectors, managers and rank-and-file employees. While constructing such a research model, it is worth paying attention to it being adapted for a smaller group of indicators describing these interorganizational relations and intellectual capital in order to accurately depict the level of both elements present in enterprises.

Conclusions resulting from empirical research on the level of intellectual capital in enterprises and its impact on innovation and competitiveness of the surveyed companies, as well as general information presented, may especially serve future investors, who will want to invest their capital in Georgian companies in the future. The cooperation of enterprises in the area of creating the interorganizational relations and their impact on the innovativeness of enterprises is a phenomenon that is becoming more and more apparent in the area of shaping the intellectual capital in a changing environment.

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Knowledge Management Research: A South African Perspective

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Abstract: This paper presents a bibliometric study of knowledge management research trends in South Africa. The study analysed publications over a twenty-year period, focusing on their research methods, the theoretical and conceptual frameworks adopted, the types of papers published, and the main themes of knowledge management research. Two journal publications were selected for the analysis: The South African Journal of Information Management (SAJIM), and the South African Journal of Libraries and Information Science (SAJLIS). One hundred and eighteen (118) papers were analysed. The results revealed that the number of knowledge management publications increased in the mid-2000s but started to decline in 2013. Most of the research was empirical, and the majority of studies did not adopt any theoretical or conceptual frameworks. It was noted that literature reviews were popular with researchers and many of the studies focused on general knowledge management issues covering South Africa, Africa and the globe. Further research is recommended to look at the reasons why other research areas are ignored and the reasons for the decline in the number of publications in recent years.

Keywords: knowledge management, knowledge management research, South Africa, bibliometrics, publication trends, K-TSACA

1. Introduction

Knowledge management (KM) is a topic of interest in academia and practice (Grant, 2015) that has culminated in the rise of a broad spectrum of diverse knowledge management research publications over the years (Ragab and Arisha, 2013). South African scholars and practitioners, like their peers across the globe, have been engaged in knowledge management research **since** its inception**.** Serenko (2013) outlines four generations of knowledge management, beginning in the 90s worldwide. The analysis of knowledge management publications has been conducted by a number authors focusing on different periods and areas of interest. The studies have analysed research themes, theoretical frameworks and methods, units of analysis, citation analysis, and many other relevant issues**.** The majority of these analyses have focused on international trends and international journals and conference publications. Examples include studies by Ribiere and Walter (2013) and Fteimi and Lehner (2016).

This study focused on knowledge management research trends from a South African perspective. To the best of the researcher's knowledge, no study has analysed knowledge management research trends in South Africa from 1998 to 2018, although a recent study by Fombad and Onyancha (2017) looked at the trends in knowledge management for development in South Africa from 2002 to 2015. This study is different from Fombad and Onyancha's (2017) in that the data sources and theoretical frameworks that were adopted are different. This study analysed the number of articles published over the selected period (1998 - 2008), the theoretical and conceptual frameworks adopted, the units of analysis, geographic coverage, and the main areas of knowledge management research. Two South African journal publications were selected, that is *SAJIM* and *SAJLIS*. These two journals were selected because they appear in The Scientific Electronic Library Online's (ScieLO) list of journals (ScieLO, n.d). Journals that appear in the ScieLO list are regarded as prestigious by the South African academic community. First published in 1999, *SAJIM* publishes academic and practitioners' research. It focuses on a number of broad fields, including information and knowledge management (*SAJIM*, 2019). According to the *SAJLIS* website (*SAJLIS*, n.d.), *SAJLIS* is the official journal of the Library and Information Association of South African (LIASA). It was first published as *South African Libraries* in 1933 and later changed its name to *SAJLIS* in 2002 (*SAJLIS*, n.d.). It mainly publishes Library and Information Science research, including knowledge management. Journals that do not appear in the ScieLO list were left out because the researcher believed that they would not have enough publications.

The paper is structured as follows: literature review, conceptual framework, methodology, findings, discussion, and conclusion and recommendations.

2. Related work

A number of studies have been conducted globally to analyse knowledge management research. This trend began in the early 2000s when knowledge management was starting to gain popularity. Gu (2004) conducted a bibliometric analysis of knowledge management research and found that at the time, knowledge management had not yet developed its own body of literature. The findings of Gu's study are not surprising because in the early 2000s, knowledge management was just starting to attract the interest of academics and practitioners. Other studies analysed other topics, such as theoretical frameworks, research methods, the units of analysis, knowledge management areas of research, and publication trends, among others. Ragab and Arisha's (2013) study concluded that knowledge management research falls into five categories: ontology of knowledge and knowledge management; knowledge management systems; the role of information technology; managerial and social issues; and knowledge measurement.

Through content analysis, Ribière and Walter (2013) analysed knowledge management themes over a 10-year period and found that knowledge sharing is the most mentioned key concept in knowledge management research in the *Journal of Knowledge Management Research and Practice*. Fteimi and Lehner (2016), in their analysis of the European Conference on Knowledge Management's (ECKM's) publications, found that research focused on knowledge processes, innovation, learning and technology. Akhavan *et al*. (2016) likewise conducted a bibliometric analysis of knowledge management research over a 24-year period to analyse the number of authors, keywords, references and pages of publications. Alajmi and Alhaji (2018) conducted a bibliometric and content analysis of publications from 2002 - 2016 and found that knowledge management publications were increasing during the selected study period. Most recently Ramy *et al.* (2018) conducted a scientometric analysis investigating productivity, research themes and methods, and citation analysis issues in knowledge management research. In South Africa, Fombad and Onyancha (2017) investigated the research trends in knowledge management for development. They found that there was increasing research on knowledge management in South Africa, but little focus on knowledge management for development.

The brief literature review indicates that different types of studies have been conducted around the globe on the trends in knowledge management publication. It also indicates a dearth of similar studies in South Africa. This study aimed to address that gap.

3. Theoretical background

A number of knowledge management theories have been developed over the past two decades in line with how invaluable knowledge has grown in the 21st century. Today there is the understanding that it has and continues to improve organisational processes and routines, thereby growing the economy (Ramy, 2019), and this understanding stems from knowledge management pioneers such as Nonaka, Wiig, Senge and many others who laid a strong knowledge management theoretical foundation, leading to growth in the field and a growth in the number of research publications over the years.

Knowledge management is viewed from three perspectives: the schools of thought perspective (Earl, 2001); the personalisation and codification perspective (Hansen, Nohria and Tierney, 1999); and the lifecycle perspective (Alavi and Leidner, 2001; Evans and Ali, 2013; Shongwe, 2016). This study views knowledge management from the lifecycle perspective. That is, it views knowledge management as a series of processes that are adopted by organisations in their endeavour to manage knowledge. These processes include, among others, knowledge acquisition, creation, sharing, storage, transfer, and application (Heisig, 2009; Evans and Ali, 2013; Shongwe, 2016).

A brief review of the lifecycle frameworks reveals that each framework consists of different processes. For example, Heisig's (2009) framework is made up of six main processes. These are knowledge sharing, creation, use, storage, identification, and acquisition. Dalkir's (2011) framework consists of processes such as knowledge capture and/or creation, sharing and dissemination, and acquisition and application. Evans and Ali's (2013) consists of six processes: identify; organise and store; share; apply; evaluate and learn; and create. Evans, Dalkir, and Bidian (2015) further developed their framework to include seven phases: identify, store, share, use, learn, improve, and create knowledge.

Shongwe (2016) synthesised existing frameworks and developed a unified framework with five processes: knowledge transfer, storage, acquisition, creation and application (K-TSACA). This study adopted the K-TSACA

framework (Shongwe, 2016) as a guide to classify knowledge management studies into five themes or categories. This framework was adopted because as the latest in a long line of frameworks, it has attempted to combine other processes from previous frameworks.

3.1 Concepts of the K-TSACA framework

Five concepts of the K-TSACA framework are briefly defined in this section, namely knowledge transfer, storage, acquisition, creation, and application. According to Thomas (2019, p.12), knowledge transfer is the process by which people use a familiar domain (base) to understand a novel domain (target). Zander and Kogut (as cited in Chen and Lovvorn, 2011) define knowledge transfer as the successful movement of knowledge that results in the receiver implementing new techniques of production. The K-TSACA framework uses the terms 'knowledge transfer' and 'knowledge sharing' interchangeably. Samoilenko and Nahar (2013) define knowledge storage as the process of collecting relevant knowledge, keeping it in organisational databases, and using it to achieve organisational goals. Knowledge acquisition is obtaining knowledge and experience from different sources with the aim of incorporating them into organisational procedures (Zheng, 2012). Mitchell and Boyle (2010) define knowledge creation as a series of activities or processes that add value to a service or output. It is the development of new ideas that reflect a significant elaboration or enrichment of existing knowing. Knowledge is created through a social collaborative process and individuals' cognitive processes (Gottschalk, 2007).

Knowledge is applied when an individual's or unit's experiences influence a change in the behaviour of other individuals or units (Nesheim, Olsen and Tobiassen, 2011). It is when knowledge that is gained over time is used or applied in organisational routines and processes. Holsapple and Joshi (2002, p.57) assert that "using knowledge is the activity of applying available knowledge to create new knowledge and produce an externalisation of knowledge". These concepts are used in this context to classify knowledge management research into themes.

4. Methodology

This study used bibliometric analysis. Artefacts in the form of journal articles were examined in detail to gauge their coverage of knowledge management as a subject matter in South Africa. One hundred and eighteen (118) articles were analysed over a twenty-year period (1998 - 2018). The articles were retrieved from the archives of *SAJIM* and *SAJJLIS*. A total of 93 (79%) articles were retrieved from *SAJIM and* 25 (21%) from *SAJLIS*. Table one shows the number of articles retrieved.

Tables 1: Number of articles retrieved for analysis

Year	SAJLIS	%	SAJIM	%
1998	2	2	0	0
1999	0	0	3	3
2000	0	0	1	1
2001	0	0	2	2
2002	2	2	1	1
2003	0	0	4	3
2004	1	1	6	5
2005	1	1	8	7
2006	1	1	9	8
2007	2	2	8	7
2008	1	1	4	3
2009	2	2	6	5
2010	2	2	3	3

Year	SAJLIS	%	SAJIM	%
2011	3	3	5	4
2012	1	1	9	8
2013	1	1	4	3
2014	1	1	2	2
2015	2	2	5	4
2016	1	1	2	2
2017	0	0	6	5
2018	2	2	5	4
Total	25	21	93	79

The articles' titles were used to identify publications of interest, using the keywords "knowledge", "knowledge management", "intellectual capital", "knowledge work", "communities of practice", "learning organisations", and "organisational learning". Titles that did not include these words were excluded. Upon completion of this process, a coding framework was developed. The framework captured the following information: publication trends, type of publication, the methods used to conduct studies, the units of analysis, the theoretical and conceptual frameworks adopted, and the research themes (as informed by the framework adopted). It is worth noting that there were no online editions available for the years 1999 - 2001 in *SAJLIS* because as indicated earlier, it only started publishing as *SAJLIS* in 2002. It had a different name prior to 1999.

5. Findings

This section presents the findings of the study under publication trends, methods and theoretical frameworks, units of analysis, and areas of knowledge management research.

5.1 Publication trends

The publication trends of knowledge management research over the twenty year period were analysed in order to determine the knowledge management research output over the selected period. The findings revealed that knowledge management articles started appearing slowly, with only two articles in 1998 and three in 1999, before dropping in 2000, 2001, and 2002. This trend was noticed in both *SAJLIS* and *SAJIM*. A significant increase in publications was noted in *SAJIM,* but only from 2003 to 2012. This increase was not steady because the numbers fluctuated each year. A notable decline occurred between 2013 to 2018 in *SAJIM*, and it is not clear what caused this. We would have expected that by this time, knowledge management research would have reached some level of maturity and that publications would have been increasing steadily. Figure one illustrates the results.
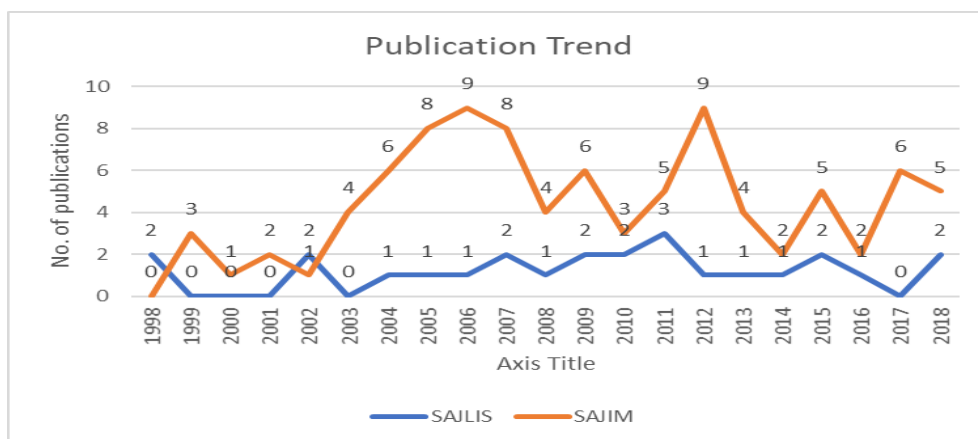
Figure 1: Knowledge management publications, 1998-2018

5.2 Publication by type

Publication by type differentiated between empirical and conceptual papers. Empirical papers use empirical data and conceptual papers do not. Conceptual papers include literature reviews and theoretical and conceptual framework development. The findings indicate that empirical papers were the predominant publications in both *SAJLIS* and *SAJIM* in South Africa. Over the selected period, there were 71 (60%) empirical papers compared to 47 (40%) conceptual papers; *SAJLIS* had 16 (64%) empirical papers and nine (36%) conceptual papers, and *SAJIM* had 55 (59%) empirical papers and 38 (41%) conceptual papers. Figure 2 illustrates the results.
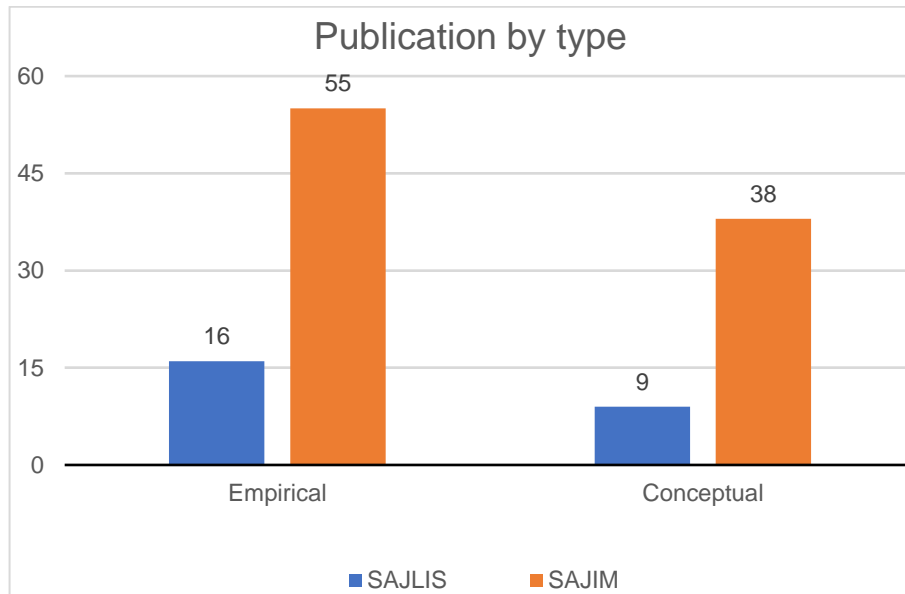
Figure 2: Publication by type

5.3 Research methods adopted in knowledge management research

The study also sought to investigate the research methods used in knowledge management publications in the two journals. The intention was to determine which methods are popular among knowledge management researchers. Eight research methods were found to have been used by researchers over the twenty year period, namely surveys, bibliometrics, case studies, content analysis, literature reviews, ethnography, grounded theory, and narrative analysis. Table two presents the results.

Table 2: Research methods adopted by knowledge management researchers

Method	Journals		Total	Total %
	SAJLIS	SAJIM		
Literature reviews	10	38	48	41
Survey	6	25	31	26
Case Studies	6	21	27	23
Bibliometrics	2	2	4	3
Grounded Theory	0	4	4	3
Content Analysis	0	2	2	2
Ethnography	0	1	1	1
Narrative	1	0	1	1
Total	**25**	**93**	**118**	**100**

The findings show that literature reviews were popular in knowledge management publications in both *SAJLIS* and *SAJIM*, with 48 (41%) articles. Most were traditional literature reviews, with one systematic literature review. This systematic review was grouped under empirical research. Surveys were the second most popular method with a total of 31 (26%) articles, followed by case studies with 27 (23%) articles. Of the 27, six were multiple case studies and 21 were single case studies. Bibliometrics and grounded theory were each adopted in four (3%) studies; content analysis in two (2%), and ethnography and narrative analysis were adopted in only one study each (1%). The results therefore indicate that literature reviews are preferred by knowledge management researchers in South Africa.

5.4   Units of analysis

The findings revealed that most of the publications 49 (42%) did not have specific units of analysis. Forty (34%) papers focused on a local context (an African and/or South African context). Nineteen (16%) focused on one or more named public organisations in South Africa, Africa or globally. In the context of this study, public institutions include government departments (national, provincial/state, and local), educational institutions, and government-controlled institutions. Seven (6%) were business or private institutions either in South Africa or Africa, and three (3%) covered a global perspective. The findings are provided in Table three.

Table 3: Units of analysis and scope

	Unit of Analysis			
Coverage	**SAJLIS**	**SAJIM**	**Total**	**Total %**
Not Applicable	5	44	49	42
Local	11	29	40	34
Public	8	11	19	16
Business/Private	0	7	7	6
Global	1	2	3	3
Total	**25**	**93**	**118**	**100**

5.5   Theoretical frameworks adopted by knowledge management researchers

Adom, Joe and Hussein (2018) state that a theoretical framework is a blueprint that a researcher adopts to underpin a study. They define a conceptual framework as a structure explaining the concepts and theories that the researcher uses to explain how the research problem is going to be explored. In the context of this study, a theoretical framework would be an existing theory or model that has been developed and used to inform a study, while a conceptual framework is a detailed explanation of the key concepts and/or theories that inform a study. The results show that most knowledge management studies did not adopt either a theoretical or a conceptual framework (56; 48% of the articles). Fifty-one (43%) used conceptual frameworks and 11 (9%) theoretical frameworks. Of the 11 theories and models used, the Socialisation, Externalisation, Combination and Internalisation (SECI) model and the Diffusion of Innovations theory (DoI) were used three times. Communities of Practice were used in two studies, and the Organisational Capacity Theory, Theory of Reasoned Action, and Retention Model were used once each. Table four outlines the results.

Table 4: Frameworks used in articles

	Frameworks			
Type of Framework	**SAJLIS**	**SAJIM**	**Total**	**Total %**
No Framework	11	45	56	48
Conceptual	11	40	51	43
Theoretical	3	8	11	9
Total	**25**	**93**	**118**	**100**

5.6 Areas of knowledge management study

The areas of study or themes were also investigated. The themes were informed by the K-TSACA framework. The results indicate that most of the publications covered general knowledge management issues (80; 68% of the articles). That is, they did not fall under any of the framework's categories. For example, articles about knowledge management systems, knowledge management and corporate culture, knowledge management in organisations and municipalities, etc., do not fall under any of the framework's categories. Two of the 80 articles were on intellectual capital, one focused on absorptive capacity, and another was on knowledge auditing. Knowledge sharing/transfer was the second most studied area with 25 (21%) articles. These findings support the K-TSACA model, which assumes that knowledge management research focuses mainly on knowledge sharing and transfer (Shongwe, 2016). Articles on indigenous knowledge came third with 10 (8%) articles, followed by studies on knowledge storage and creation with two (2%) and one (1%) article respectively. There were no studies on knowledge acquisition and application. It is worth finding out why this is the case. The results mean that South African knowledge management research focuses mainly on general knowledge management issues. Table five presents the results.

Table 5: Areas of knowledge management study

Areas of study				
Themes	**SAJLIS**	**SAJIM**	**Total**	**Total %**
General/broader issues	17	63	80	68
Transfer/sharing	2	23	25	21
Indigenous knowledge	6	4	10	8
Storage	0	2	2	2
Creation	0	1	1	1
Application	0	0	0	0
Acquisition	0	0	0	0
Total	**25**	**93**	**118**	**100**

6. Discussion of findings

The findings indicate that knowledge management research increased in the mid-2000s but started to decline in 2013. The reasons for this decline are unknown. A steady increase in research would have been anticipated until 2018. Grant (2015) opines that globally, knowledge management research has reached its maturity. Fteimi and Lehner (2016) share this sentiment. They are of the view that knowledge management research is growing exponentially. Alajmi and Alhaji's (2018) recent study found a steady growth of knowledge management studies between 2002 and 2016. Possible reasons for the decline in South Africa could be that the journals are shifting focus, or that South African researchers are shifting their focus to other fields of study.

The results also indicate that most of the research conducted was empirical research. Ramy *et al.* (2018) made a similar observation in their scientometric study of a top knowledge management journal. The same results were noted in prior studies by Guo and Sheffield (2008) and Dwivedi *et al.* (2011). The findings of this study therefore confirm this global trend.

Literature reviews were found to be the most dominant research methodology used, followed by case studies and surveys. These results confirm Serenko's (2013) observation that literature reviews are the most used research method in knowledge management research. Ramy *et al.'s* (2018) study produced similar findings, but Guo and Sheffield (2008) had different results, identifying surveys as the most dominant research method. Gou

and Sheffield's results are not entirely contradicting this and other study's findings because surveys were also found to have been used numerous times by knowledge management researchers.

The unit of analysis is not stated in most studies, but those who did mention them indicated that local organisations were mostly researched. Dwivedi *et al.* (2011) found that local small and medium enterprises were the focus of many researchers.

Many studies did not adopt either a theoretical or conceptual framework. This is surprising because academic researchers are encouraged to use theoretical and conceptual frameworks to inform their research. The main research themes that were noted were knowledge management in general, knowledge sharing, and transfer and knowledge storage. These results are consistent with Fteimi and Lehner (2016) who found that general knowledge management issues predominate publications, followed by knowledge sharing and knowledge transfer. Similar results were noted by Ribière and Walter (2013). They ranked knowledge sharing and knowledge management first and second respectively as the main keywords/concepts studied in knowledge management research. Ramy *et al.* (2018) found knowledge sharing to be the top research topic in knowledge management. The findings of this review confirm the findings of these studies.

7. Literature gaps identified

The study identifies literature gaps that we believe are prevalent globally, and others that are unique to South Africa. In South Africa, there are areas of knowledge management that are under-researched or rarely studied, such as intellectual capital, knowledge auditing, acquisition, application and organisational learning.

8. Recommendations for further research

Focus on under-researched areas in KM is therefore encouraged. The reasons for the decline in publications also requires further investigation.

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Knowledge Utilization, Communication and Innovations in Aquaculture in an International Perspective

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Abstract: The aquaculture sector worldwide is becoming increasingly important as a provider of healthy food, and production has grown considerably in volume. At the same time, the sector is also facing increasing environmental challenges. The need for innovation has escalated, together with the use of advanced production equipment and high-level biological competence, while at the same time striving for environmental sustainability. In this paper we focus on how aquaculture now has become a knowledge intensive production. Firms must be able to manage knowledge to fulfil competence demands, often requiring a change in communication patterns. The other main subject is about how innovative developments are related to competence, communication and culture aspects like trust. We have just completed data collection from three firms: two in Norway and one in Chile, where we have studied how knowledge management takes place and how innovations can be linked to drivers like the ones mentioned above. This paper offer insights about relationships concerning knowledge management and innovations and how this affects the operation of the firms by comparing the production of the same commodity, harvested salmon, in three different firms with quite equal production equipment but different operational frameworks like management styles, knowledge levels and cultural background. We find, like in most studies, links between firm operations and knowledge management, and knowledge and innovations, but these links do not have the same structure in Norway and Chile. Factors like competence and communication structure as well as cultural factors like trust seem to explain most of the differences between the firms.

Keywords: knowledge management, communication, innovations, harvested salmon, Norway, Chile

1. Introduction

Knowledge as an essential component of competitiveness for any firm has been recognized for several decades. This was first ascertained for high-tech production firms and knowledge organizations. Prior to the 1990's, aquaculture was viewed as a low-tech industry where feeding to a large extent was done manually and the optimal amount of feed given was based more on experience and intuition rather than on technologically advanced equipment and methods. This picture has now radically changed. To be successful in aquaculture now, firms have to manage three high-tech knowledge intensive processes, feeding, logistics and fish health, and also be able to develop these processes in an innovative way.

The paper will first present a discussion of how knowledge within this framework can contribute to competitiveness and innovations. Then we will introduce an empirical study based on data collection from three aquaculture firms, two in Norway and one in Chile. Here we will analyze the role of knowledge utilization and management in fostering competitiveness and innovative development, and finalize by discussing how the results can be interpreted.

The research questions we will try to answer are:

- What are the consequences of relations between knowledge management and competence, communication and innovative initiatives (like changes in routines) for the operation of aquaculture firms in Norway and Chile?

- How are the relationships between innovations and knowledge influenced by communication, competence and cultural factors like trust?

2. Theoretical background

2.1 Intellectual capital and knowledge-based capital

Sources for the development of the concepts of intellectual capital (IC) are Edvinsson and Malone (1997) and Bontis (1998) and knowledge capital (KC) MERITUM (2002). The definitions and use of the concepts IC an KC are quite parallel and here we use the definitions from MERITUM (2002) where they suggest that the firm's knowledge capital is equal to the sum of three elements:

- 1. Human capital: defined as the knowledge that employees have and hold, regardless of whether they are in the workplace or not, for example the employees' expertise, education etc.

- 2. Structural capital: defined as the collection of knowledge that stays in the company, such as formal rights to knowledge, patents, corporate practices, databases, descriptions of routines etc.

- 3. Relational capital: defined as all human capital and structural capital that is associated with the network of all external business relationships, such as contacts to subcontractors, marketing etc.

The concept of knowledge-based capital (KBC) recently proposed by OECD (OECD 2013) is also designed to measure the intangible assets in which firms invest and develop. The OECD report divides KBC into three categories:

- 1. Computerized information (software and databases)

- 2. Innovative property (patents, copyrights, designs, trademarks)

- 3. Economic competencies (including brand equity, firm-specific human capital, networks of people and institutions, and organisational know-how that increases enterprise efficiency)

2.2 Knowledge and skills

All firms have knowledge capital but the important task for the firm is to develop the knowledge capital into skills. Skills are normally understood as the capacity of the firm to customize the knowledge capital to the needs of the firm and combine that with the physical capital in the optimal way. This understanding can be traced back to Schumpeter (1934) via Prahalad and Hamel (1990) and up to recent work on knowledge in organizations by e. g. Takeuchi et al (2013). The central strength of skills as a result of knowledge is that it can improve in value by learning, unlike physical capital assets. Firms can determine the value of knowledge capital using the following keywords, see e. g. MERITUM (2002) and Westeren et al (2018):

- Identification: Looking at knowledge in relation to the processes that are crucial for value creation in the company – core competences.

- Measurement: Finding a useful set of indicators to measure the knowledge capital as it actually is.

- Management: Developing a management system for the company which takes into account the effects of knowledge capital toward achieving corporate goals.

This delineation establishes the concept of core competencies which Prahalad and Hamel (1990, p. 81) have defined in this manner: "Core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies."

2.3 Knowledge management

Knowledge management has been linked to the interpretation of the knowledge concept and the definitions of IC and KBC. Schiuma et al (2012) defined Knowledge Management (KM) as "the set of management activities that enable the firm to deliver value from its knowledge assets", Schiuma et al (2012, p. 618). Hansen et al (1999) looked at KM strategies using two points of departure, codification and personalization. This is developed further by Hislop (2005) where he analyzes KM from the objectivist perspective and the practice-based perspective. The objectivist perspective is grounded in a positivist philosophy of science where codification of knowledge is the central aspect, and this implies that knowledge can be stored and retrieved and made operational in such a way that hypothesis testing is possible. Personalization means that we do not assume a subject-object split and is based on a hermeneutic and/or constructivist philosophy of science and here the concept of tacit knowledge, see Polanyi (1962), can be handled with scientific seriousness.

Hussinki et al (2017) have several examples showing how KM is defined by its practice. A more Scandinavian-oriented model, Irgens and Wennes (2011) looks at KM as:

- Resources, such as intellectual capital, representing the knowledge base of the firm.

- Knowledge processes as generic activities, such as the acquisition, sharing and creation of knowledge.

- Purposeful organizational and managerial practices aimed at managing both resources and processes to create organizational benefits.

KM practices can be divided into categorizations and Heisig (2009) compared 160 KM models and proposed grouping the most studied KM success factors into the following categories:

- human-oriented,

- organization-oriented,

- technology-oriented and

- management process-oriented

Within the category of human oriented KM, supervisory work is central to establishing favorable conditions for KM in an organization. Empirical studies, like the one in this project, have revealed that supervisors who participate, inspire, delegate, and support are valuable organizational members, as their involvement is linked with positive firm performance. Supervisors also pave the way for any KM agenda by creating a trustful, respectful atmosphere and creative culture by coordinating knowledge integration within a firm. The effect on firm performance may be more pronounced if supervisory work is combined with sufficient technological support and a KM-specific training regime. Another human oriented KM process is enhancing learning mechanisms like improving the quality and increasing the amount of organizational knowledge and competence. We see in this project that firms emphasizing learning invest in transferring knowledge from experienced employees to less experienced employees through activities like mentoring, apprenticeships, and job rotation.

Technological proficiency has emerged as a basic competence in a modern firm. In today's world, practically all codifiable knowledge is available through various digital channels; thus, firms adopt new IT practices, as technological solutions can facilitate better leverage over the firm's knowledge resources and enable organizational learning. Recently, the phenomenon of "big data" has become increasingly important to KM, as firms have access to more data from internal and external sources, which they can combine and utilize in their value creation.

2.4 Knowledge and innovation

The links between knowledge and innovations have been well established at least since the 1990's and in 2017 a book by Bathelt et al (2017), "The Elgar companion to innovation and knowledge creation", presented 47 chapters about innovation and knowledge and had more than 5000 references about this subject. One conclusion from the book is that this subject still needs more research, but it also has gotten extensive attention in later years. In relation to the focus of this paper it is interesting to notice that the ideas of Schumpeter about "new combinations" and "creative destruction" Schumpeter (1934; 1942) are still very relevant and frequently discussed, as also in Bathelt et al (2017). The choice of keywords for the innovation process: intention, spark, social construction, and landing, gives a framework for the innovation processes we study in this article. The process of knowledge association and recombination, Mumford et al. (2009), has important parallels to the innovation processes we are studying in the empirical part here.

Ideas need to be implemented and require networking skills, Baer (2012), and translation processes. Normally firms can only to some extent plan for this and are often dependent on the assumption that tacit knowledge processes are converted into explicit knowledge. After some time, the innovative idea has gained sufficient maturity and thereby gained trust, so the organization is willing to invest resources in actual development of a spark that now has become a project. Westeren (2017) and Westeren et al (2018) show that cultural differences may play an important role in how successful the organization is to convert an innovative idea into a project. Innovation management has turned into a science of its own, see e. g. Tidd and Bessant (2018). They posit that knowledge requirements often change in structure and content in the innovation management phase, but still there seems to be a large need for a more holistic view on knowledge.

3. Empirical part

3.1 About the data collection and the firms in the study

The empirical part is based on a study of three aquaculture firms, Midt-Norsk Havbruk in Norway, Marine Harvest (now renamed MOWI) Region North in Norway, and Marine Harvest in Chile. Data collection is based on a questionnaire and took place from the beginning of 2017 to the end of 2018. We collected 37 responses from eight sites for Midt-Norsk Havbruk (MNH), 52 responses from six sites from Marine Harvest Region North (MH Nord) and 35 responses from ten sites from Marine Harvest Chile (MH Chile). Each site has a site manager and 3-7 operators in the working team. The data collection has a representative distribution of answers from site managers and operators.

3.2 Competence

Competence is an important part of the knowledge that the individual possesses and in this study we have analyzed competence from three perspectives: basic education, competence gained during work on the sites, and course participation. We have registered the educational level of everyone who participated in the survey and it is classified according to international standards (World Economic Forum, 2015) by using a grouping where the lowest level is 1: Not completed 9-year primary school and the highest 6: University education.

Based on this information we have calculated an average level of education at each site and the results are shown in Table 1. The other indicator for examining competence is the individual's understanding of the technology used at the site. This has been investigated by asking all at the sites for understanding technology based the following four options:

1: Must have special training and long (more than 30 minutes) explanation
2: Must have more than 10 minutes but less than 30 minutes explanation
3: Understand with a short (less than 10 minutes) explanation
4: Understand immediately without explanation

The results in Table 1 show that the Norwegian sites score higher on all competence variables.

Table 1: Results of competence variables for MH in Chile and Norway and MNH

		Average educational level	Understand technology	Attended courses last year	Attended courses last month
MH Chile	N	35	35	35	35
	Average	3.34	2.80	3.07	0.57
MH Nord	N	52	52	52	52
	Average	4.43	3.73	3.46	1.00
MNH	N	37	37	37	37
	Average	4.27	3.73	3.62	1.30

N: Number of answers (This abbreviation is used for all tables)

3.3 Communication

In the data collection we have asked site managers and operators about the communication they have upwards in the system, about the communication they have with each other, and about the communication there is between the manager at the site downward to the operators. Communication is also dependent on group size and at MH Chile the average is 6.14, MH Nord is 5.02, and for MNH the number is 3.92. Another contextual consideration is that the technological equipment is more advanced in Norway than in Chile, like underwater camera equipment, computers for feeding and other communication equipment. Another difference in production routines is a higher degree of rotation of work assignments in MH Nord in Norway. At MNH the management of feeding was centrally controlled, but there was communication between the location and the central management. In Chile the manager of the site and the assistant manager were responsible for managing the feeding, with other operators rarely involved. These differences in the organization of the work had influence

on the communication patterns. Table 2 shows that the average number of initiatives for communication in general are higher in Norway than in Chile.

Table 2: Communication pattern at the sites in Chile and Norway

		The number of initiatives to talk to leads one level up	Number of initiatives to talk to member in own group	The number of initiatives others in your group took to speak with you
MH Chile	N	35	35	35
	Average	4.40	6.63	5.57
MH Nord	N	52	52	52
	Average	8.06	11.33	11.31
MNH	N	37	37	37
	Average	8.73	13.16	12.76

3.4 Changes in routines

Being able to maintain and develop routines is crucial for firms where some stability in production is needed. Changing routines are seen as an indicator of the extent to which a firm has a potential to develop competitiveness and stimulate the innovation. In order to achieve this, the firm has to change and develop routines, but also must keep a certain stability in routines because this is often looked at as the firm's organizational glue. When we investigated the routines in the firms, we asked about the frequency of changes in routines and the extent to which changes were implemented. Table 3 shows the main results from the questions asked about changes in routines with the following answer categories:

1: Never
2: Earlier than you can remember
3: The last 3 months
4: Last month
5: Last week

Table 3: Changes in routines

		Changes in routines	Formal changes in routines
MH Chile	N	35	35
	Average	3.86	1.34
MH Nord	N	52	52
	Average	3.65	3.25
MNH	N	37	37
	Average	4.11	3.84

Since higher numbers show greater frequency of submitting proposals, the results show large differences in the process of formalizing proposals for changes in routines at the sites in Chile compared to Norway, which means clearly higher implementation capacity in Norway. By formal changes we mean the routine must be documented in a written and/or IT-based way. Regarding the extent to which the proposals have been followed up, there is also a relatively large difference between Norway and Chile in the sense that around 94% answer yes to follow-up in Norway while the corresponding figure is 63% in Chile, see Table 4.

Table 4: Follow-up of proposals for changes in routines.

		The proposal for a change in routines has been followed up		
		Yes	No	Total
MH Chile	N	22	13	35
	%	62.9%	37.1%	100.0%
MH Nord	N	49	3	52
	%	94.2%	5.8%	100.0%
MNH	N	35	2	37
	%	94.6%	5.4%	100.0%

3.5 Innovation

In this project a thorough data collection on innovation was done and about 20 questions were asked on this topic. Innovation is currently one of the most discussed topics in economics and about societal development in general, cf. Westeren et al. (2018), where there is a thorough discussion of innovation in theory and practice. It is not easy to interview employees in firms about innovation and innovative suggestions because one must try to distinguish this from suggestions for changes in production more generally. The criteria we used for innovation are taken from the Oslo Manual, OECD (2005), where the central criterion is that the proposal will bring something new to the firm and that the proposal should not have been described as a routine or operation the firm has done before. Most of the suggestions for innovative ideas are linked to the production process at the site. The scope for the proposals is very large, ranging from major changes in feeding systems to smaller proposals on new ways to carry out maintenance and other technical tasks. Of special interest in this analysis is the utilization of knowledge in relation to innovations. Table 5 gives results about whether the innovation needs new knowledge to be implemented.

Table 5: Does innovation need new knowledge to be implemented?

		The innovation needs new knowledge to be implemented		Number of valid answers	Not answered
		Yes	No		
MH Chile	N	18	12	30	5
	%	60.0%	40.0%	100.0%	
MH Nord	N	39	10	49	3
	%	79.6%	20.4%	100.0%	
MNH	N	30	4	34	3
	%	88.2%	11.8%	100.0%	

It was also asked whether innovation needs new ways of exchanging knowledge (see Table 6). The structure of the answers is clear since there is a preponderance of positive answers in both countries. In Norway, a large majority of the projects need new ways of exchanging knowledge and that proportion is higher than in Chile.

Table 6: Does innovation need new ways of exchanging knowledge?

		Innovation needs new ways of exchanging knowledge		Number of valid answers	Not answered
		Yes	No		
MH Chile	N	20	10	30	5
	%	66.7%	33.3%	100.0%	
MH Nord	N	42	7	49	3
	%	85.7%	14.3%	100.0%	
MNH	N	28	6	34	3
	%	82.4%	17.6%	100.0%	

Questions were asked about whether the innovation affects the corporate culture (Table 6) and there is some difference in the structure of the answers. The main response is generally negative in all three firms, however in Norway there is a somewhat more even distribution of the answers, while in Chile it is more decisively negative. This is in line with our impression during data collection that corporate culture is more prevalent in Norway than in in Chile, see Table 7.

Table 7: Does the innovation affect organizational culture?

		The innovation affects the organizational culture		Number of valid answers	Not answered
		Yes	No		
MH Chile	N	4	26	30	5
	%	13.3%	86.7%	100.0%	
MH Nord	N	19	30	49	3
	%	38.8%	61.2%	100.0%	
MNH	N	16	18	34	3
	%	47.1%	52.9%	100.0%	

Table 8 addresses the question of whether there is a need for stronger trust between those working at the site in order to implement the innovation. This question generated a clear yes in Norway, while we get a clear no in Chile. One explanation for this in Chile is the more two-tier leadership structure in place there. In Norway, it was stated during the interviews that the innovations could be challenging, especially with regard to new technology, that necessary confidence was important.

Table 8: Does the idea require a stronger network of trust between employees?

		The idea requires a stronger network of trust		Number of valid answers	Not answered
		Yes	No		
MH Chile	N	10	20	30	5
	%	33.3%	66.7%	100.0%	
MH Nord	N	40	9	49	3
	%	81.6%	18.4%	100.0%	
MNH	N	25	9	34	3
	%	73.5%	26.5%	100.0%	

4. Discussion of results and conclusions

There are different possibilities to define outcome variables for fish farming, in this project we have collected data for fish health and asked about the results from fish health control by the veterinarian. This is believed to be an interesting indicator for how the production is going on. The first research questions in this study is about the operation of the firms and how this is related to knowledge capital concerning educational level, understanding of technology, communication and knowledge management, and innovative initiatives. From Table 1 we saw that the Norwegian firms scored higher on the competence variables than the one in Chile. There are different possibilities to analyze how the competence variables statistically can be linked to outcome of production. We have tested different types of statistical models but since the ambition of this paper is to give a broad understanding of possible relationships; we use results based on Pearson correlation coefficients using the SPSS system. The results in Table 9 show that two competence variables, "Understand technology" and "Participated last month in courses" are significantly correlated to the outcome variable. This means that intellectual capital is important, but it is the applied competence that shows correlations. Our impression from the data collection was that the educational level was important as a fundament for the variable "Understand technology". This indicates that education level is important but statistically influential indirectly through other competence variables.

Table 9 also show positive correlations between the outcome variable and the communications variables. This is in line with other studies, see Westeren et al (2018). It is interesting to note that more advanced technological equipment seems to a driver for more frequent communication between all levels in the firm. When it comes to routines they have to be formalized to show positive correlation to the outcome variable.

As previously stated, aquaculture has developed in a high-tech, knowledge-intensive environment where production is dependent on successful innovations. We have tested the variable "Innovative idea needs new knowledge" to see how this is correlated with communication variables, competence variables, and variables about changes in routines, see Table 10. Only one of the communication variables is significant when linked to the innovation variable and that is about communication upwards in the firms. This implies that the role of the site manager as the knowledge broker seems to be most important to bring knowledge messages about innovations up to the decision level. Competence is also important for innovations but here the pattern is a little different from the results from the more general operations of the firm. For innovations more basic knowledge like educational level seems to be the most important driver. Understanding of technology is significant but with less strength. The course variable is not significant implying that being able to innovate via new knowledge needs a deeper understanding than just short applied courses. Changes in routines also show interesting results here and it is not enough to be able to come up with the innovative idea, it is also necessary to be able to formalize the innovative idea to get results.

Trust is a key concept in innovative developments. In this study we have looked at one variable "Idea requires stronger network of trust" and analyzed how this variable relates to other innovation variables like "Innovative idea needs new ways to exchange knowledge", "Innovative idea affects organizational culture", and "Innovative idea planned/done". We find positive correlations between the innovation trust variable and the other three

variables, see Table 11. Correlation coefficients do not prove anything but the results give us an indication that trust plays an essential role in innovative processes because new ways of exchanging knowledge are dependent on relationships and one thing we know about innovations is that they always to some degree are uncertain. Also, the successful building of organizational culture is in general dependent on trust which we also find from the results here. We find that the ability not just to plan, but also to implement the innovation differs between the firms. The correlations are indications that a higher level of trust increases the firm's ability to complete the innovation process, which is in line with other research like Tidd and Bessant (2018).

A summary of the results shows that intellectual capital and knowledge management play a role for firm operations and innovative activities, but the links work through different mechanisms. This project gives implications about which mechanisms are the most important ones and the results also emphasize context dependency. We will recommend further research based on empirical perspectives taking different contexts of the firms into consideration, We have too many general results that "better knowledge is good for stimulating innovations", without paying enough attention to context, culture, and level of technology, see Bathelt et al. (2017).

Table 9: Correlations between outcome variables and communication, competence and changes in routines

		No talk to leader	No talk to members of the group	Group member initiative talk to you	Average education level	Under-stand technology	Partici-pated last month in courses	Change in routines	Formal change in routines
Result from control	Correlation	.289**	.408**	.368**	0.113	.293**	.196*	0.070	.210*
	Sig. (2-tail)	0.002	0.000	0.000	0.234	0.002	0.037	0.461	0.026
	N	113	113	113	113	113	113	113	113

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table 10: Correlations between innovations and communication, competence and changes in routines

		No talk to leader	No talk to members of the group	Group member initiative talk to you	Average education level	Understand technology	Participated last month in courses	Change in routines	Formal change in routines
Innovative idea needs new knowledge	Correlation	.343**	0.096	0.145	.268**	.200*	0.125	0.042	.296**
	Sig. (2-tail)	0.000	0.310	0.124	0.004	0.034	0.188	0.659	0.001
	N	113	113	113	113	113	113	113	113

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table 11: Correlations between trust and innovation variables

		Innovative idea needs new ways to exchange knowledge	Innovative idea affects organizational culture	Innovative idea planned/done
Innovative idea requires stronger network of trust	Correlation	.198*	.241*	.228*
	Sig. (2-tailed)	0.035	0.010	0.015
	N	113	113	113

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

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Modelling the IT Support of Knowledge Workers for Knowledge Management Processes

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Abstract: Knowledge management processes, such as knowledge-based processes, represent an important interdisciplinary issue in the fields of industry, knowledge management, education, library sciences and research. Solving the Information and Communication Technology (IT) support of these processes belongs to the preferred topics of current research. The business and industrial Information and Knowledge Management Systems are well-managed at a level of simple data processing. But there is a gap in the software support for the higher top manager level, as well as regarding the personalized IT support for knowledge workers in the knowledge-based organizations. In fact, it is crucial for the knowledge workers to solve the conversion of tacit knowledge to explicit knowledge and to transfer and exchange knowledge both individually and collaboratively. Currently, the IT support is moving to the cloud and virtual environments, so complex software, hardware, and network infrastructures are needed. This requires a design and technology team behind every knowledge worker. The actual research of the authors is focused on automating the knowledge-based processes. A basic question is to define the knowledge as a process parameter. To challenge the above-mentioned gaps, a virtual Knowledge Unit (vKWU) has been designed that is both human- and machine-readable. This knowledge representation enables to design the WPad software, solve the batch knowledge processing paradigm for knowledge creation and sharing, and IT support of the Knowledge Management processes of knowledge workers. The WPad works in practice as a multi-purpose IT tool for conversion of tacit information to explicit information, including the personalized Knowledge Management System, as was presented by the authors in the previous ICICKM conferences. While under research on the technology-enhanced learning, their focus was on Knowledge Management (KM) in education (teaching, self-study, CSCL). Now, the research focus is on testing the online virtual spaces for KM. Currently, Cloud Content and Project Management are tested on the BOX-cloud, including the KM at the faculty's virtual space, where the content and processes are modelled by the V4+ACARD Consortium. The paper explains by examples the research paradigm in the context of KM, and the use of the KM software for text corpora, cloud content management and research.

Keywords: knowledge management, knowledge representation, tacit knowledge, KM software for knowledge workers, text corpora, cloud content management

1. Introduction

Despite the great progress in computerization of the knowledge-based processes, there are still many challenges particularly regarding the personal IT support of the knowledge workers, including the top managers. According to the authors of this paper, it is a question of "knowledge" because any interdisciplinary definition of human knowledge is missing, including a knowledge representation, which would be suitable for IT support of KM (Svetsky, Moravcik and Tanuska, 2017). As was discussed by the authors in the section "Research Background – Terminology and Challenges for IT Support of KM", regarding the interdisciplinarity of the issue of knowledge, human knowledge has different meanings in philosophy, education, psychology, knowledge management (Svetsky, Moravcik, Tanuska, Sakal, 2018 - see also e.g. Glasersfeld, 2002, Nonaka and Lewin, 1994). Knowledge has different meanings even in the fields of computer science and information and communication technology (Frost, 2017). In addition, in the Stanford Encyclopedia of Philosophy, some categories of knowledge are distinguished (Fantl, 2017). In view of this, the practical aspects of knowledge construction were described by Svetsky (2012). Due to the absence of the universal definition of knowledge, one can relatively often meet with the criticism that the technology-driven approach in the knowledge-based processes is prevailing (Kinchin, 2012), or that the software design for technology-enhanced learning is inadequate (Martens, 2018).

Because Knowledge Management is generally the process of acquiring, creating, managing, handling, using, and sharing the knowledge and information, each process must be described by appropriate algorithms in order to write source codes or software applications in general. But without having the proper representation of knowledge, which is human-readable, it is difficult to write a personalized software for knowledge workers, i.e. to solve their IT support for KM in a user-friendly way. In the context of this paper, the term "knowledge workers"

refers to all those who work with information and knowledge, i.e. teachers, researchers, engineers, managers etc. Specifically, this term also applies to "knowledge workers" as defined by Drucker (1969), who defined knowledge workers as high-level workers who apply theoretical and analytical knowledge.

This paper presents the paradigm of the human knowledge processing, which is based on the model of knowledge representation, and the development of our own KM software. Some examples are illustrated with focus on using the text corpora for purposes of KM at the level of the knowledge workers. Such personalized solution is not described in the scientific literature yet. The vKWU knowledge representation is a core of the registered utility model related to processing the unstructured data (UV 7340/2016). This knowledge-based paradigm is particularly important for IT support of knowledge sharing. For example, knowledge sharing in organizations can be benefitted from Industry 4.0 enabling technologies, introducing this as Organization 4.0. (Li et al, 2018). The importance of knowledge sharing is also emphasized by Kim et al (2012), Choo and Tan (2017) or Filieri (2010).

Paliszkiewicz (2017) discusses the question of knowledge by arguing that the body of knowledge regarding KM is still limited. According to the result of the literature review, he emphasizes that "Existing literature provides only fragmented insights into knowledge management and further interdisciplinary research is needed" and "A better understanding of tacit knowledge is needed, as is the ability to apply this knowledge in the process of work to solve and identify complex problems in organization". Regarding the future KM research, see also https://realkm.com/2017/08/11/the-future-of-knowledge-management-research/.

In principle, the described approach of the authors represents a universal paradigm for any kind of knowledge handling and processing for any kind of KM process. Finally, it should be mentioned that this research on the IT support for knowledge-based processes is not theoretical because each solution was operatively implemented into industrial or academic practice (teaching, learning, research, and associated processes), which is performed by knowledge workers (teachers, researchers, engineers, students).

In Section 2, a comparison with state-of-the-art KM software for knowledge workers is discussed. In Section 3, the paradigm of the knowledge processing in the context of KM is presented, and in Section 4, some examples of the use of the WPadV4 software for text corpora, cloud content management and research are mentioned.

2. Comparison with state-of-the-art KM software for knowledge workers

In comparison with several previous and actual studies focused on KM (Wallace, Van Fleet, Downs, 2011; Jokonya, 2018; González-Valiente, Santos, Arencibia-Jorge, 2019), any similar research focus on personal software for knowledge workers based on the human-readable knowledge representation, which enables the conversion of tacit knowledge (KW) to explicit knowledge, has not been mentioned. In Jokonya's study, the extant literature on KM research is reviewed to examine trends in KM research also in relation to the 4th industrial technologies (2018). In the study, the data-driven approach is prevailing, and "still low research on artificial intelligence" indicated, although, newer technologies "brought major impact knowledge management domains in areas such as data storage, data management, integration and behavioural issues" (Paschek et al., 2018). But it must be emphasized that these areas, or the data-driven approach particularly, are suitable only for machines but not for the knowledge workers who work with human knowledge and information rather than with simple data.

The authors' presented concept, in comparison with the existing approaches, is not the data-driven but the knowledge-driven approach. This means that knowledge, information and data are processed within the hierarchy data-information-knowledge-wisdom. "Empty" knowledge is treated as the most primitive information (i.e. knowledge without content), and "empty" information is treated as the most primitive data (numbers, short strings). In principle, this approach is based on the simulation of the knowledge-based processes (mental processes) in the same way as how knowledge workers or common people think. While computers need other technology for data processing than for information processing and for knowledge processing, the presented WPadV4 software enables the knowledge worker to use it as an all-in-one-tool, moreover to use their natural language, their personal computers, and to process a huge amount of files (content). Moreover, this does not require any additional informatics skills when using the KW-tables or KW-bases, as well as their personal or collaborative corpora. In other words, working with the virtual knowledge, in which the human knowledge is embedded, is not the case of the data-driven approach as is in the challenge for using the shared

open corpora in relation to "build predictive models to address business problems in organizations" (Pattanshetti, Jasola,, Gupta, Rajput, 2018).

Some issues of using the corpora for KM have been discussed in the previous ICICKM conferences. For example, "managers from different hotel departments/divisions were motivated to create a corpus of a rich collective guest-related external knowledge" (Choo and Tan, 2017). In another case, a corpus containing over 1000 peer-reviewed articles was used for "Interdisciplinary Cooperation Management in Research Clusters" (Müller-Abdelraze, 2018). In compliance with the trend of using the clouds for shared KM, the authors and researchers of the V4+ACARD-Consortium practice it when using the BOX-Cloud and remote desktops for sharing some categories of the corpora.

In addition, to better understand the design of the IT support for the knowledge workers, information systems (IS) should be mentioned that are important in view of KM field. The lowest level of IS is used for very well-defined problems, for mass processing of well-structured sharp data (e.g. for economic IS, production control). The higher levels of IS are systems consisting of individual data or non-sharp data (e.g. customer relationship management /CRM/). IS for the managerial decisions are focused on the key-data extraction from common IS of companies (Smejkal, Rais, 2007).

3. The paradigm of the knowledge processing in the context of KM

The authors' research focuses on the automation of processes based on human knowledge, which is simulated in their research by means of a model of the virtual knowledge unit (vKWU). This knowledge representation is machine-readable as a data type consisting of a default structure of zeros and ones. The computer processes such virtual knowledge extremely quickly and delivers the human-readable outputs. This enables simulation of the knowledge-based processes, allowing them to be semi-automated or automated.

The principle of this simulation is based on how an ordinary person thinks. For example, a meeting of schoolmates after years, the person would describe as "metadata" (which indicates what school, class, year, names), and the content of this event as "knowledge" (which indicates how was the meeting, what happened). In the case of the virtual knowledge, the knowledge worker can write such metadata and content simply into the fields of the classic database table, as illustrated in Fig. 1. The vKWU consists of metadata and content as ASCII-text, which is written into this default structure in natural language. If the user inserts his personal metadata and content into the vKWU, this means that tacit knowledge is converted to explicit knowledge, which can be handled by the WPadV4 software.
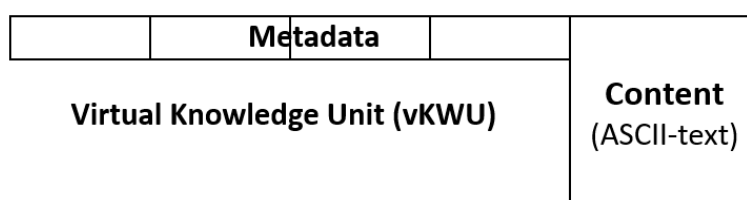
Figure 1: The model of the Virtual Knowledge Unit (metadata + content)

This approach is universal, that is, the knowledge representation does not have to be primarily in the form of the database table (it could be e.g. a set of arrays). However, the great advantage of it is that each database platform enables one to write source codes or database applications. In this case, the vKWU represents one row of the database table, and more rows represent the "knowledge table" (KW-table) or "knowledge-cell" (KW-Cell). Each empty KW-table is in principle an empty knowledge base. Fig. 2 illustrates the KW-table "ICICKM19" that was created for the purpose of writing this paper. One can create a set of KW-tables and write source codes to handle, manage and control the virtual knowledge (KW-tables), as well as write database applications or even a KM-system. In this context, the main author of this paper has been developing the beta in-house software WPad (presently WPadV4) which works as the multi-purpose all-in-one tool for personal IT support of knowledge workers. It should be emphasized that from the KM point of view, any kind of knowledge management processes can be supported, and because the knowledge representation (vKWU) is interdisciplinary, any kind of knowledge can be processed. However, a user must always find his own way how to insert his human knowledge into the default data structure of the virtual knowledge (vKWU). In this context, the knowledge worker can produce a set of tables for the purpose of teaching and learning, KM, e-Learning, self-learning, or research, project

management, writing papers, thesis, and so on. The users can also create KW-tables with ten thousand rows or more and use it as a text repository or text corpus as the basis for their personalized and tailor-made KM.
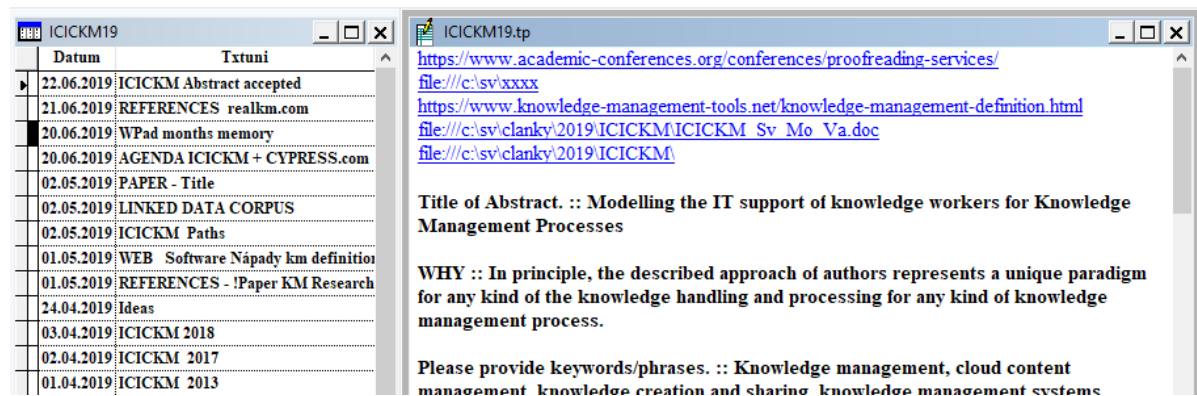
Figure 2: Example of the knowledge table ICICKM19 (metadata – left window, content – right window)

Modelling the IT support of knowledge workers for KM-Processes is based on using the above-mentioned knowledge processing paradigm when using the model of the vKWU and writing source codes and user menus of the WPad software application. In other words, this modelling depends always on an existing algorithm (sequences of steps) of KM-processes. If the algorithm of the managerial processes is known, informatics algorithms can be written as source codes. The activities can be simple (e.g. creating the knowledge base, filtering or searching) or more sophisticated (e.g. creating KM-system, KM-portal, writing client-server application). By using the user's menu items, the human knowledge, after its insertion into the KW-table, is handled, managed and controlled (filtering, searching, saving, converting to html-files, sending to other KW-tables, etc.), or executable applications can be made by using a combination of the sequences of the user's menu items (client-server solutions; adoption to Windows, clouds and remote desktops; English support). This is illustrated in Fig 3. by an example of one of the categories of the user menu of the WPadV4.
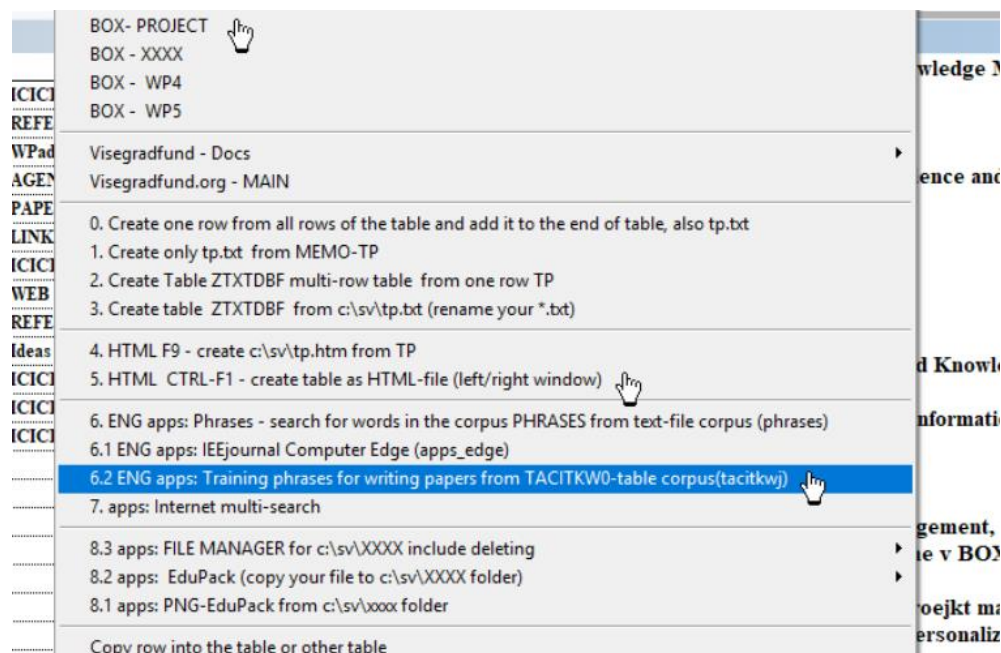
Figure 3: Screenshot of the user menu of the WPadV4

4. The use of the WPadV4 for text corpora, cloud content management and research

4.1 Applications for using text corpora

There was an intention within proposing the PanEULangNET project (the ICT17 call of the Horizon 2020: https://ec.europa.eu/programmes/horizon2020/en) to join engineers and computational linguists to create corpora from engineering and expert information for automatic machine translation. Within solving the V4+ACARDC project, this idea was now implemented for support of writing research papers in English, which is

not the native language of the research team from five European countries. To test it, the proceedings from the ICICKM 2018 were inserted into the KW-table XXXX as the text corpus. This text corpus has functioned as a basis for extracting sentences containing the required phrases. For example, the menu item 6.2 extracts the required phrase from the personal training corpus consisting of the proceedings' content. Fig. 4 illustrates inserting the phrase "point of view" and the resulting KW-table and HTML-file with sentences containing the phrase.
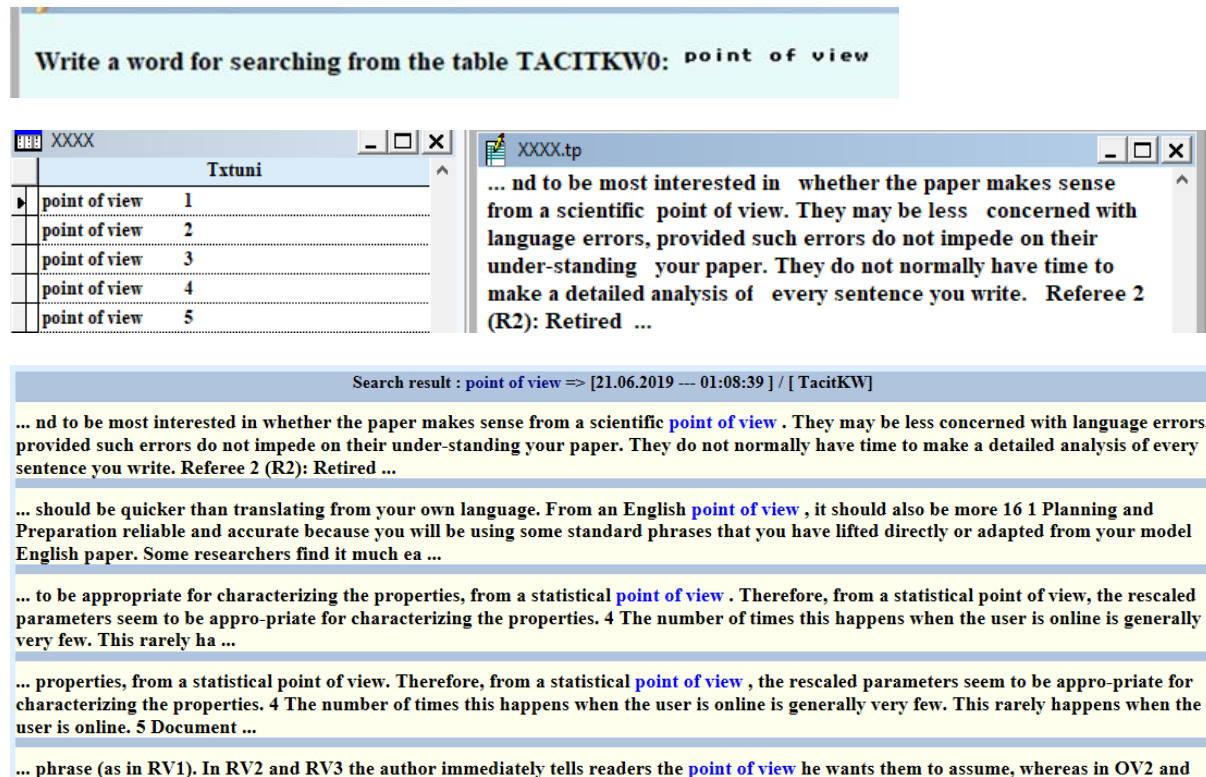
Figure 4: Screenshots from extracting the phrases "point of view" from the text corpus (proceedings)

The following Fig. 5. shows the possibility of using the same text corpus for searching whether a similar research focus was presented at the ICICKM 2018 conference. As shown in the right window, the sentences were marked (tagged) with the pair "(((" ")))", then automatically extracted to the new row at the end the KW-table, and then used as the reference in Section 2.
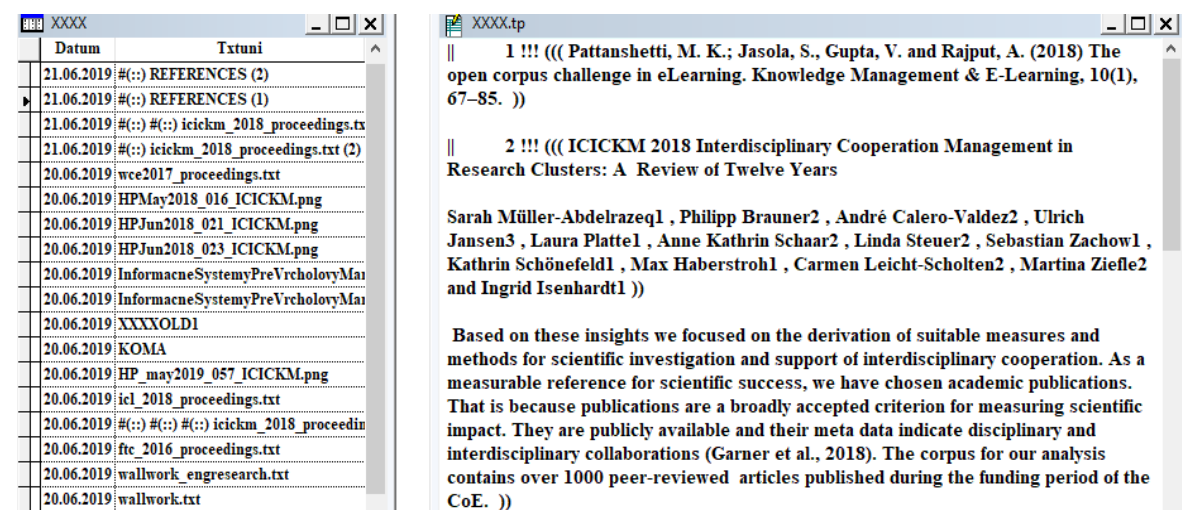
Figure 5: Screenshot of the use of the method of "natural text marking" that is developed by the authors

4.2 The personalized KM paradigm for designing heterogeneous off-line/online corpora

The previous example has illustrated using the text corpus, i.e. the KW-table which is on the user's computer or virtual remote desktop with Windows 10 (virtual machine). Each knowledge worker has their human knowledge (personal content) embedded not only in their KW-Tables but also in the thousands of computer files, which are stored in many heterogenous formats (pdf, doc, txt, mp3, jpg, etc.). Additionally, in our case, the knowledge worker uses a set of the KW-tables, which can be joined and transmitted between off-line and online environments by using the WPadV4 software (the WPadV4 is the updated WPad-version). From the informatics point of view, this required to solve a concentration of both the KW-tables and computer files by joining them into one "knowledge package" (KW-package). But the problem was that while the KW-tables are only textual corpora, the computer files consist of many heterogeneous formats. This required the designer to solve the adoption of the WPadV4 to the Windows and hardware by adding several functions typical for file management tools to the user menu. Fig. 6 illustrates the resulting KW-package, which was created as the HTML-output (after converting the KW-Table "XXXX"), which enables browsing through the heterogeneous files, e.g. after clicking on the ICICKM-model paper (i.e. on row 10 in the KW-table), the user can read the model paper for this conference.
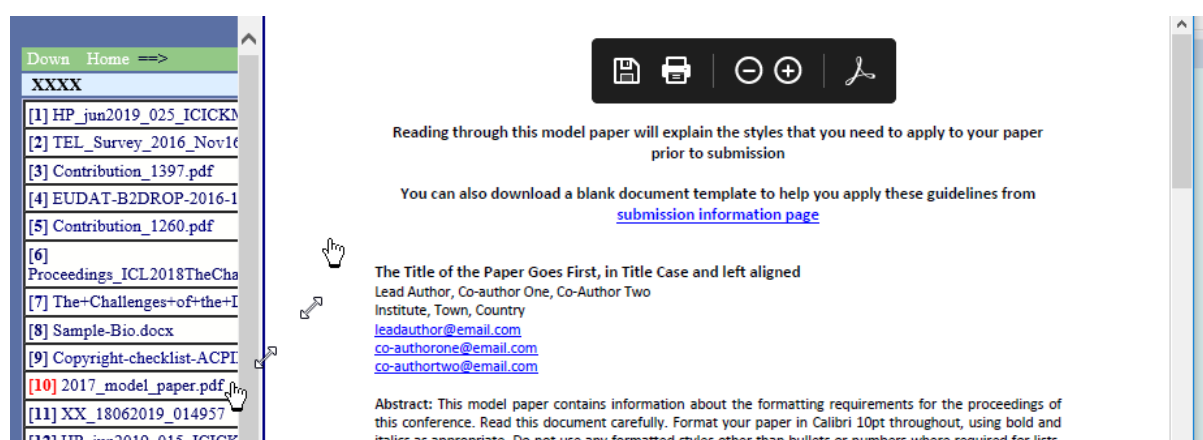
Figure 6: Example of the single KW-package which is browsable in the Microsoft Edge browser

4.3 Cloud content management

At the beginning of the V4+ACARDC project, it was needed to join the researchers from the five European countries in order to enable the knowledge flow and exchange for the purposes of the KM-Processes. In collaboration with IBM Slovakia, the shared area on the BOX-Cloud was implemented that enables users to perform Cloud Content Management (CCM). This CCM service enables the users to create folders and sub-folders, as is common when using Windows Explorer or file managers at their personal computers. The CCM also provides for synchronization of the folders by ensuring automatic transfer of files from personal computers to the main folders of the BOX-cloud. Of course, each partner has also their own folder. The project manager of the International Visegrad Fund (https://www.visegradfund.org/) has direct access to the project's folders, so she can overview the progress operatively within the entire duration of the project. The synchronization, the way of structuring the content, using the file manager's functions, and the possibility to send internal mails within the Consortium was a good background for using the BOX-Cloud for shared KM-Processes, and for testing the Cloud Project Management.

It should be mentioned that the WPadV4 is not installed on the BOX-Cloud because the cloud service does not have Windows, in which the WPadV4 could work as the client-server solution. However, in combination with the BOX-Cloud, due to the possibility of synchronization (automatic transfer of the files), the project leader, as well as the designer, can browse the BOX-Cloud content from their computers and project partners from their notebooks (see also the previous screenshot of the user menu). Fig. 7. shows the infrastructure used for communication within the V4+ACARD Consortium (MTF-team are researchers from the Faculty of Materials Science and Technology, which leads the project).
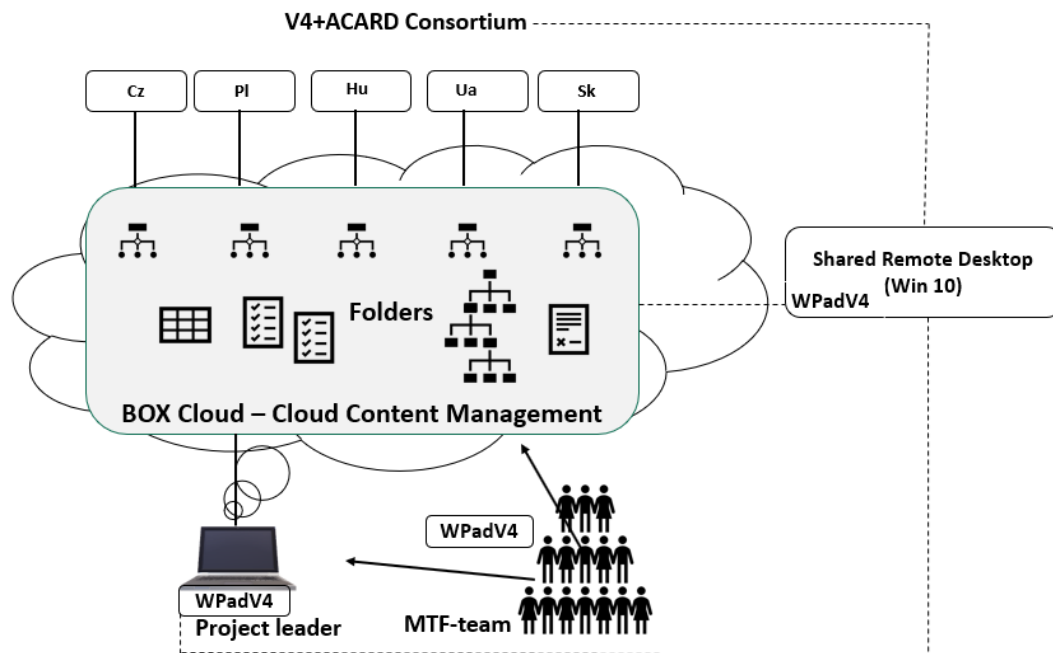
Figure 7: The scheme of the communication paths for transmitting the KW-flow within the infrastructure

5. Conclusions

The state-of-the-art of the IT support for the KM-Processes is characterized by a gap in the software support for the personalized IT support of knowledge workers for KM-Processes, including the higher top managers in the knowledge-based organizations. The authors have presented some examples from their research results, i.e. how the IT support for the KM-processes were solved in the real situations in the university teaching and research. In this context, this paper presented as the added value:

- the paradigm for the information and knowledge processing in the context of KM, which is based on the model of the knowledge representation by using the vKWU;

- the all-in-one, multi-purpose WPadV4 software for performing this paradigm at the level of individual knowledge workers;

- the new approach for using knowledge corpora within the Knowledge Management, and Cloud Content Management.

It should be emphasised that the knowledge-based paradigm and WPadV4 software is developed as the all-in-one, multi-purpose KM-tool particularly for IT support of individuals to enable them knowledge creation, sharing, exchange and transfer, as well as, within community of researchers via technological infrastructures. In this context, Nonaka (1994), with his dynamic theory for organizational knowledge creation, defines interactions between individuals as the foundations for knowledge creation.

Despite the authors' research is empirical, the added value is also to the theory of knowledge, because authors have found a suitable interdisciplinary representation of knowledge, or universal "definition" of knowledge respectively, as the "meta-information and content" that is both human and computer readable. To the best of authors' knowledge, any similar representation or definition was not described yet in the scientific literature. In general, computers are machines for information processing, therefore computers do not understand human natural language, so any human knowledge must be converted to machine information. This has been solved up by the above-mentioned "virtual knowledge unit", which represents the needed isomorphic relationship between mental processes and physical processes (computers). Namely, a necessary condition must be fulfilled that isomorphic relationships exist between the specific system abstractions and real physical systems (Glaserfeld, 2002).

From the KM point view, the limitation of the authors' research is given how any knowledge worker is able to insert tacit and explicit knowledge into the knowledge tables, including linking the content of computer files that are in many formats and contain heterogenous data. It is also very important, if people are willing to collaborate

and share their knowledge. From the informatics point view, the file size should not be larger than 250-MBytes for a convenient work (max. 1-Gigabyte). The content of the knowledge tables is needed to consider as a smart content or smart data in comparison with the content of files (e.g. pdf/ doc-files) and big data.

The KM-processes are associated with mental processes, i.e. they are knowledge-based. Due to the above-described paradigm, which enables the knowledge worker to process a large amount of human knowledge without additional informatics skills, the future work represents a never-ending story, also in view of the IT support of TOP-level managers. According to the comparison with the state-of-the-art, the presented paradigm seems to be beyond the state-of-the art regarding the personalized approach for developing the WPadV4 as the KM software.

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Mapping six Characteristics of New Learning Organization in Indonesian Education Technology Startups

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Abstract: The aim of this preliminary empirical research paper is a deeper understanding of how education technology may produce better learning performance and meet educational needs in emerging countries. Using a new perspective of learning organization (Daly and Overton, 2017), this research examines the roles of six characteristics of new learning organization at Indonesian education technology (EdTech) startups and investigates their challenges and opportunities. This study uses qualitative research and involves working with rich data such as texts, documents, artefacts, in-depth interviews, and observations (Sale *et al.* 2002). Multiple case study research was conducted in Indonesia, and we also compared our research with a Beijing EdTech startup case. The preliminary findings discovered six characteristics at Indonesian EdTech startups, including: *1) Clarity of Purposes,* a shared vision and an open dialogue; *2) Holistic People Experiences,* a trusted brand that keeps its promises and strives for innovation; *3)* a *Thriving Ecosystem,* a people-led system that enables its teams to thrive and learn; *4)* an *Agile, Digitally Enabled Infrastructure,* a virtual environment that enables the fluid exchange of knowledge and ideas; *5) Intelligent Decision Making*, a robust platform using performance analytics to drive organizational performance and customer experience, and *6) Continual Engagement*, a dynamic community that continually builds on business relationships. This study also identified the maturity level of new learning organization adoption at Indonesian EdTech startups. Recommendations about challenges and opportunities in implementing the new learning organization to improve the Indonesian EdTech startups are needed. Future research could incorporate the variables of *effectiveness of EdTech in improving learning performance and educational quality in emerging countries such as Indonesia.*

Keywords: the six characteristics of new learning organization, Indonesian education technology startup

1. Background

Education and skills have become two of the important pillars of the knowledge economy index (World Bank Institute, 2008). In emerging countries, the recognition of the importance of education and its impact on equality has led governments to adopt policies regarding minimum education requirements. According to the "Indonesia Educational Statistics" report (2015/2016), there were 25.9 million active students at that time (Ministry of Education and Culture, 2016), and by 2018, this figure had risen to 45 million school-age children (ages 5–17 years), with 83.32% active students, 12.64% not yet active students, and 4.04% dropouts (Ministry of Women's Empowerment and Child Protection and Indonesia Central Bureau of Statistics, 2018). Having 17,504 islands spread all over the Indonesian region (Indonesia Central Bureau of Statistics, 2017), educational quality and equality have become serious issues in Indonesia. To address these, education technology startups provide an "oasis" in the middle of Indonesia's education phenomenon.

Education technology startups combine two very different worlds. As startups, it is important to realize the intrinsic differences that are brought together in this new and exciting field (Eshed, 2014). However, the term "education" is synonymous with institutions and conservatism, while the meaning of the term "technology" is driven by innovation and out-of-the-box thinking. Catherall (2005) stated that the use of information, communication and technology (ICT) in education all promote learning by using technology. E-learning, online learning, blended learning, learning management systems, and mobile learning are different types of learning technologies, and each has its own particular features. An education technology startup needs to bridge the gap between the institutional world and the world of innovation.

A major problem that has arisen is that education technology startups in Indonesia remain limited in number compared with the total number of young people (Pratama, 2018). Based on Central Bureau of Statistics data, in 2017, Indonesia had 261 million members of the younger generation (5–18+ years old) but only 12 education technology startups (Lee, 2018). More comprehensive information about education technology startups is shown in Table 1 Mapping Indonesian Education Technology Startups, in the analysis section. The novelty of this

study is its goal of developing deeper understanding about how education technology startups can produce better learning performance and meet educational needs in the Indonesian context.

2. Literature review

2.1 Education technology

According to the Association for Educational Communications and Technology (AECT, 2004), education technology is a study and practice that facilitates learning in order to create, manage, and use technology to improve teaching and learning experiences. In the technology age (Reeves and Love, 2012), the ability of learners to be technologically savvy is pivotal (Joseph, 2012). Thus, education technology and learning technology have become more important factors related to skills for global development.

2.2 Startup definition

Startups are characterized as new ventures with limited technical and financial resources (Usman and Vanhaverbeke, 2016, p. 172), bound by their liabilities of newness and smallness (Freeman *et al.,* 1983), lack of access to adequate resources (Hannan and Freeman, 1989), and a scarcity of resources that coerce them to search for external partners to develop and commercialize their ideas or technologies (Teece, 2007). In addition, they have a tendency to work with open innovation (Anthony, 2012).

2.3 The new learning organization characteristics

Daly and Overton (2017, p. 17) introduced "*Driving the New Learning Organization",* which focuses on *the clarity of purpose,* propels people, sustains their impact and binds everything together.
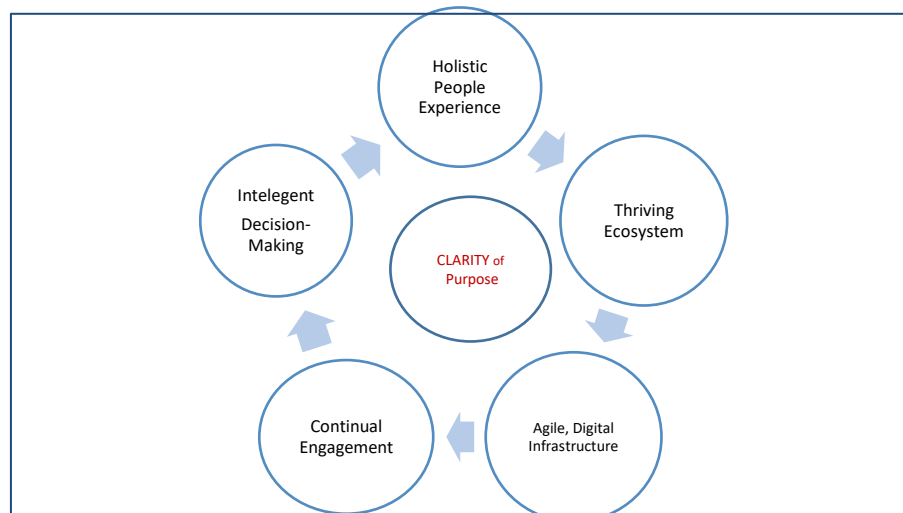
Source: Daly and Overton, 2017

Figure 1: The new learning organization – (Daly and Overton, 2017)

From figure 1, we can see that driving the new learning organization are six characteristics including: 1) *Clarity of Purpose,* a shared vision and an open dialogue on how people are valued and need to adapt to deliver the organization's performance; 2) *Holistic People Experiences*, a trusted brand that keeps its promises and develops innovative, commercial and continuous learning opportunities' 3) a *Thriving Ecosystem,* a people-led system that enables its teams and the extended enterprise to thrive and learn linked to common goals; 4) an *Agile, Digitally Enabled Infrastructure,* a virtual environment that enables the fluid exchange of knowledge, ideas and adoption of competence; 5) *Intelligent Decision Making,* a robust platform using insight and performance analytics to drive organizational performance and customer experience; and 6) *Continual Engagement,* a dynamic community that continually builds on business relationships resulting in energy, resilience and growth.

These six characteristics of the new learning organization will guide organizations to unlock their potential to grow, profit, and undertake transformation in the technology age.

3. The research

3.1 Research questions

Because of time constraints and our wish to confine our research to a pilot study, we limited our investigations to RG, the most comprehensive startup in education technology services with the fastest growth and the most awards (UNICEF Youth Innovation Forum, 2015), and ZenDu, the first Indonesian education technology startup. We addressed two principal questions:

- 1. What are the roles of the new learning organization characteristics in Indonesian education technology startups for providing better learning performance and meeting educational needs in the Indonesian context?

- 2. What are the challenges and opportunities faced by Indonesian education technology startups implementing the new learning organization?

To answer these questions, we gathered the data and analyzed them based on in-depth interviews and observations, and collected and analyzed documents and artefacts such as national and international news, videos, websites, social media, and internal publications relating to the two research objects.

4. Research methods and procedures

4.1 Methods

This study uses a qualitative approach according to Sale *et al.* (2002); qualitative research is used primarily in conjunction with the philosophy of interpretivism research. This research involves working with rich data such as texts, in-depth interviews and observations; this allows researchers to construct new understandings of the underlying social reality and phenomenon. Multiple case study research was used, which involves the study of a case in a real-world, contemporary context or setting (Yin, 2014).

4.2 Sampling technique

This study used a purposeful sampling technique (Berg and Lune, 2004; Creswell 2013) with criteria of respondents with subordinates, having more than one year of work experience at an education technology startup.

4.3 Procedures

The research was conducted between March and June 2019 on the premises of the ZenDu Jakarta office and the RG Jakarta office. For this study, we conducted in-depth interviews and observations, and we analyzed artefacts such as videos, official education technology startup social media, news, and company reports. Semi-structured interviews were conducted with four respondents following an interview protocol and ethics code. The strength of qualitative interviews is in providing background information and context, generating ideas, and providing in-depth information about each participant's views, perspectives and motivations (Newing, 2011). Interviews were conducted with a content analyst, a tutor manager, a social media manager, and the vice presidents of Engineering for ZenDu and RG. The research was conducted following standard ethical procedures, using informed consent and ensuring that there was no conflict of interest.

5. Analysis

5.1 Mapping Indonesian education technology startups

The first Indonesian education technology startup is ZenDu, established in 2007. It offers recorded education contents, and by 2017, it had successfully entered the ranks of the top 10 Indonesia startups (Startup Ranking, 2019). Many education technology startups are entering the Indonesian market and offering a variety of education technology services, and the most comprehensive is RG, which is also creating innovation in education technology at the fastest rate. Table 1 elaborates the mapping of Indonesian education startups with their education technology services and innovations, their history and their business focus.

Table 1: Mapping Indonesian education technology startups

No	Name of EdTech Startup	Year Established	Focus of Business Strategy (Uniqueness)	Education Technology's Services							
				Video	Video Chat	Mobile Apps	E-learning	Software	EdTech Marketplace	Digital Bootcamp	Online Try Out
1	ZenDu	July 2007	Digital learning material for junior and senior high school	X		X		X	X		X
2	Quipper	2010	Online learning for high school students	X		X					
3	Haruka Edu	2011	E-Learning for university students			X	X				
4	AIMSIS	February 2013	Academic information management system in schools			X	X				
5	Kelase	March 2013	Learning management system, using social network services & online learning (for elementary school through university students)			X	X				
6	KelasKita	2013	Using blended strategy between E-learning platform and social media			X	X				
7	Squline	2013	First foreign language online course in Indonesia		X	X					
8	RG	April 2014	Comprehensive learning management system and EdTech marketplace	X	X	X	X		X	X	X
9	Quintal	2014	Using blended strategy between school information systems & learning management systems			X		X			

No	Name of EdTech Startup	Year Established	Focus of Business Strategy (Uniqueness)	Education Technology's Services							
				Video	Video Chat	Mobile Apps	E-learning	Software	EdTech Marketplace	Digital Bootcamp	Online Try Out
10	Bahaso	2015	Digital application platform for learning English			X					
11	Sukawu	September 2015	Marketplace for non-formal education and cooperation with many universities			X			X		
12	PrivatQ	September 2017	"On the Go" and integrated education service order			X			X		

Source: Elaborated by the authors (2019)

6. Indonesian education technology – challenges and opportunities

To be an education technology startup today is to be a bridge between the old and the new and to be at the turning point of the human educational evolution with the power to change the way people learn in the future (Freischlad, 2016). In terms of human educational evolution, there are several challenges and opportunities for education technology startups. Table 2 elaborates the challenges and opportunities faced by Indonesian education technology startups.

Table 2: Challenges and opportunities of Indonesian education technology startups

	Challenges
1	Parents still prefer and choose traditional educational methods (offline education) and seem reluctant to use online education.
2	Difficulties convincing those involved in education technology to engage in a partnership.
3	Infrastructure such as Internet and networking capacity remains inadequate.
4	Attracting the best candidates for education technology startups.
5	Roles of leaders include organization and created ideas and innovation initiatives.
	Opportunities
1	Massive opportunities are possible for providing better education using technology for Indonesian users.
2	In 2017, Indonesia became the third-largest buyer of mobile learning after China and India, with a total revenue US$ 6.8 billion (Asia Market for Mobile Learning Products and Services: 2012–2017).
3	Indonesia has a demographic bonus with numbers of active students continuing to rise annually.
4	Indonesia has a valuable opportunity to advance the knowledge index through education technology.

Sources: elaborated by the authors (2019)

From Table2, we can conclude that Indonesian education technology has the potential to change the way people learn and behave for centuries to come. This paradigm shift in how we learn will require a new learning perspective from education technology startups as organizations. With the challenges and opportunities they face, they need to be agile learning organizations.

6.1 Beijing education technology startups – benchmarking

We also elaborate on the implementation and development of education technology startups in Beijing. Our considerations for choosing Beijing education technology startups as benchmarks include proximity to a large population and a demand for quality and equality in education. Over the past 30 years, China has made dramatic changes and improvements in the field of educational technology (Xiao and Meier, 2011). The Chinese education technology framework encourages the use of educational technology, and supported by their perspectives

regarding education, most families spend about a third of their income on their children's education. Moreover, most students spend at least an hour a day engaged in some kind of online learning (Young, 2018). Qi (2019) stated that China has over 400 million students and 249 EdTech startups in Beijing, with the majority focusing on virtual tutoring. Meanwhile, many creative EdTech startups utilize a variety of online tools and out-of-the-box educational services. The booming education technology market in China is also supported by cultural factors as Chinese society has always vigorously upheld education as one of its core cultural and social values.

7. Findings

In regard to the new learning organizations' characteristics (Daly and Overton, 2017), Indonesian Edtech startups have two pivotal roles: 1) creating education technology *innovation* and 2) enhancing *learner satisfaction*. The use of the YouTube channel as a form of media made it possible to share a company's vision and mission for external and internal viewers/stakeholders and to create a digital learning atmosphere. RG successfully innovated a specific platform that enables learners and teachers to have personal interaction during online classes. Meanwhile, ZenDu has continuously provided a performance dashboard regarding its website's number of views, number of videos and video chats, its social media reach, the market growth of resellers and official agents all over Indonesia.

8. Conclusion

The challenges faced by Indonesian education technology startups are not only the creation of infrastructure and education technology innovations but also changing the way learners think and behave as learners and also as stakeholders. Our study identified how Indonesian education technology startups successfully create value not only for learners and teachers but also for stakeholders. "*Digital Bootcamp*" is an online platform innovation created by RG that successfully eliminates the barrier of using education technology for optimizing learners' educational experiences (Joseph, 2012). This innovation also makes it possible for education technology to include personal interaction between learners and teachers. Innovation in education technology (please see Table 1) makes it easier for learners all over Indonesia to access digital learning and contents.

The new learning organization characteristics play an important role in enhancing learning performance and meeting educational needs. Table 3 elaborates each of the new learning organization characteristics and their implications.

Table 3: New learning organization characteristics and implications for Indonesian education technology startups

No.	Characteristic	Manifestation(s)	Startups Implication at (Yes/No)	
			ZenDu	RG
1	Clarity of Purpose	Leaders are committed to sharing their company's vision and mission through internal videos and publications at every internal meeting and informal discussions.	Yes	Yes
		Leaders prefer open dialogue to listen to and analyze employees' ideas and resolve potential conflicts.	Yes	Yes
		A *YouTube* channel is used as media to share the company vision and mission with external and internal viewers/stakeholders.	Yes	Yes
2	Holistic People Experiences	Using and empowering social media as a key for getting in touch with and having a good management relationship with users/learners/stakeholders.	Yes	Yes
		Testimonials of success are used after adoption of the company's products and services.	Yes	Yes
		Testimonials using videos or narratives on the company's website provide encouragement to learners and stakeholders.	Yes	Yes
		Operating 24-hour interactive customer services makes it possible to respond rapidly to stakeholders' questions and suggestions.		

No.	Characteristic	Manifestation(s)	Startups Implication at (Yes/No)	
			ZenDu	**RG**
			Yes	Yes
3	Thriving Ecosystem	A well-structured recruitment system ensures finding the best and most-qualified candidates.	Yes	Yes
		A small but effective team works inside the company.	Yes	Yes
		Every team member knows exactly what he/she must do and is not reluctant to deploy ideas.	Yes	Yes
		Every employee is encouraged to think outside the box.	Yes	Yes
4	Agile, Digital Infrastructure	The ability to respond quickly to education technology opportunities and challenges.	Yes	Yes
		Prepare, manage and motivate good employees as intangible assets (as research objects in regular discussions and trials of new ideas in the context of education technology innovation).	Yes	Yes
5	Continual Engagement	Having digital media as well as physically sharing knowledge events with all stakeholders.	Yes	Yes
		Using young talented public figures from various fields as ambassadors.	Yes	Yes
6	Intelligent Decision-Making	Using the website to seek feedback from learners' personal experiences and to maintain a company's social media presence.	Yes	Yes
		Using a digital platform to engage all stakeholders and facilitate sharing sophisticated customer experiences after using the product and service.	Yes	Yes

Source: elaborated by the authors (2019)

Table 3 shows that both ZenDu and RG implemented the six characteristics of the new learning organization. Using and empowering social media as a key for contacting and developing good relationships with users/learners/stakeholders became an opportunity for Indonesian EdTech to continuously provide holistic experiences for users or learners. Meanwhile, from preliminary research interviews, the authors found that effective communication between team members – because they must work remotely – and team scaling became the greatest challenge faced by teams for developing learning organization at Indonesian education technology startups. These phenomena are encouraging for the future of research.

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Entrepreneurial Orientation and Social Networks of Entrepreneurs

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Abstract: Recently, researchers have shown a great interest in the problem of personal networks in enterprise management and specifically the problem of social networks of entrepreneurs (entrepreneurial networks, EN). On the other hand, there is still an interest in the foundations of entrepreneurship, including the issue of entrepreneurial orientation (EO). EO, as a strategic orientation, is the concept interpreted as "dominant logics" or "the strategy as a prospect" which affects further programs, processes and operations of the company. Therefore, EO provides the framework for the company's operations. In order to favor the EO development, entrepreneurs need access to various resources to identify new opportunities and also the resources and competences to exploit these opportunities efficiently, going ahead of competitors, thus, to implement innovative and proactive actions and represent moderate risk propensity (EO dimensions). EN can be a source of such information and resources which contribute to an increase in individual EO dimensions. Therefore, entrepreneurs can build EO using their ENs. The objective of the paper is to analyze the relationship between the social network created by entrepreneurs and the level of EO. The research tool was spread among the randomly selected firms. The research sample amounted to 129 small enterprises. In the paper, the essence of EN and its significance for the acquisition of information useful for conducting a business activity has been presented as well as the essence and significance of EO has been highlighted. The relationship between EN and EO has been indicated by pinpointing the significance of the network created with people who are close to entrepreneurs (strong ties) and the ones with whom weak ties are established. The value added of the paper is filling the gap concerning the research into effects of EN in the area of creating EO in Polish small enterprises.

Keywords: intellectual capital, social capital, entrepreneurial network, personal network

1. Introduction

In the contemporary economic reality, information and knowledge are the basic factors determining success and competitive advantage. At the same time, enterprises are becoming increasingly aware of the significance of intangible resources, which arouses researchers' interest in and leads to discussions on intellectual, human, social or relational capital. Simultaneously, the issue being still up-to-date is entrepreneurship, which, as pinpointed by Okręglicka (2019), is considered as a complex category regarded in terms of numerous scientific disciplines. Entrepreneurship is perceived increasingly as a process of thinking and acting which favor certain behavior (Bratnicki 2002), which links it with the issue of the significance of intangible resources as the crucial ones for its occurrence. The idea of entrepreneurship is inextricably linked to the concept of entrepreneurial orientation (EO). As a strategic orientation, EO is interpreted as "dominant logics" which affects further programs, processes and operations of the company. In order to favor the EO development, entrepreneurs need access to various resources to identify new opportunities and also the resources and competences to exploit these opportunities efficiently, going ahead of competitors, thus, to implement innovative and proactive actions and represent moderate risk propensity. EN can be a source of such information and resources, which contribute to an increase in individual EO dimensions. Therefore, entrepreneurs can build EO using social networks by gaining vital information and resources from their ENs.

The subject of the research is small enterprises due to their share in a total number of enterprises in Poland (nearly 99%) and a steady increase in their number as well as an increase in the value of production, revenues, number of employees. The objective of the paper is to analyze the relationship between the social network created by entrepreneurs and the level of EO.

2. Social capital and social networks – the key resources of firms

The rapid evolution from industrial to knowledge society, defined by the importance of knowledge creation processes, shows the relevance of the social capital of organizations (Bueno, Paz Salmador, Rodríguez 2004). In the analyses of business competitiveness, the role of the idea of social capital is increasing. Intangible assets in social capital stimulate rivalry and entrepreneurship and thus competitiveness of individuals and companies (Gagacka 2007). The term "social capital" is becoming increasingly popular (Lins, Servaes, Tamayo 2017). The

effects of social, cultural and economic factors on entrepreneurship have also been the focus of attention recently (Castaño, Méndez, Galindo 2015). It is also indicated how and to what extent the personal and professional relationships of small entrepreneurs help improve their scarce resource endowments (Hernández-Carrión, Camarero-Izquierdo, Gutiérrez-Cillán 2019).

All the definitions of social capital reveal the significance of social networks. Initially, Hanifan (1916) defined social capital as a specific set of intangible community values. Bourdieu (1986) described social capital as a resource of individuals and noticed the existence of individual social capital – a set of actual and potential resources, associated with possessing the long-standing network of relationships. Social capital is also present in the form of relational capital. Relationships in this perspective are the resources favorable for the accomplishment of individual and collective objectives (Nahapiet, Ghoshal 1998).

Daily, entrepreneurs have contacts with their family members, friends, employees, business partners, advisers, etc. These persons create EN, which is regarded as one of the most important sources for the entrepreneur's firm (Bratkovic, Antoncic, Ruzzier 2009). Social networks are considered to be more than the sum of individual connections that form the network (Aldrich, Zimmer 1986). In the case of entrepreneurs, a personal social network or entrepreneurial network (EN) can be defined as a set of direct and indirect relationships between the entrepreneur and different persons in their socioeconomic and family environment, providing various types of exchange.

Under the view of the intellectual capital approach, social capital has an action-stirring role in improving the organization (Bueno, Paz Salmador, Rodríguez 2004). According to Cohen and Prusak (2001), social capital represents the value of human connections based on confidence and on personal networks with a community vocation. Koening (1998) states that social capital facilitates the company's behavior rules, reducing transaction costs and promoting cooperation. These reasons justify the introduction of social capital into intellectual capital. Kannan and Aulbur (2004) refer to a variety of intellectual capital measurement techniques that do not fall under the classification of perceptual, process or financial. They include measures of social networks that refer to measures of interpersonal networks and authority structures (Carley et al. 2000).

3. Entrepreneurial orientation – the key measure of entrepreneurship

EO is one of multidimensional characteristics of entrepreneurship – a social process, implemented by the organization participants whose innovative, proactive and risky strategic behavior causes the transformation of the organization. Entrepreneurial organizations can be identified by means of their behavior, induced by EO (Bratnicki 2009). In other words, EO is the strategic orientation of the entrepreneurial organization, i.e. the one where entrepreneurship forms objectives, priorities and the decision-making process. EO is the guidebook for taking entrepreneurial actions and searching for and exploiting opportunities.

EO is defined as a coherent set of related operations and processes (Miles, Arnold 1991). It can be understood as orientating towards the forms of operation increasing the readiness and effectiveness of taking management decisions in situations of incomplete information (Lumpkin, Erdogan 2004). Zbierowski (2012) pinpoints that the structure of EO is based on the observation that entrepreneurial firms tend to take a higher risk than other types of companies, in particular, in the conditions of uncertainty, they proactively search for business opportunities and emphasize the importance of product innovation. Lisboa, Skarmeas, Saridakis (2016) claim that EO can be considered as an intangible component which is embedded in organizational procedures and distributed among organization members.

The concept of EO has most commonly been used in reference to two distinct phenomena (Covin, Lumpkin 2011). As a unidimensional construct, EO refers to an organizational attribute reflecting how ''being entrepreneurial'' is manifested in organizations or business units, with the specific domain of entrepreneurship understood as evidenced by risk taking, innovativeness, and proactiveness (Covin, Slevin 1989; Miller 1983). As a multidimensional construct, EO is also conceptualized, at the most fundamental level, as the manifestation of entrepreneurship as an organizational attribute (Lumpkin, Dess 1996). EO is specific explication of the style of entrepreneurial management and its identification allows for defining the manner of management and the organization attitude towards involvement in strategic operations bearing signs of innovativeness, proactivity, autonomy, competitive aggression, implemented at a certain level of risk.

Generally, scientists regard EO as a tool to measure the company's propensity towards entrepreneurship (Lages et al. 2017). The evidence strongly suggests that EO remains a vibrant research topic - one inviting spirited discussion and the frequent attention of scholars (Covin, Wales 2019). This indicates a kind of versatility of the concept of EO, which can correlate with numerous economic phenomena and fits into increasingly unstable and turbulent socio-economic environment of recent years.

4. Materials and methods

4.1 The research problem and hypothesis development

The research problem is formulated in the form of the following question: *Does entrepreneurial network have direct impact on the level of entrepreneurial orientation?* While aiming at answering this question it is worth analyzing the relationships between EN and EO.

EN, in the broadest sense, is made up of the family, relatives, friends and acquaintances from different backgrounds. Acquaintances can be connected with the business environment or not. If they are embedded in business, they can be related to enterprises being customers, suppliers, competitors or other enterprises that are not competitive towards the venture implemented by the entrepreneur. These people can also perform jobs related to business indirectly. They may be bankers, lawyers, accountants or consultants. Therefore, they represent both weak and strong ties, thus constituting the potential for the acquisition of information and resources valuable for the entrepreneur. The conglomerate of ties in the entrepreneur's network provides a variety of benefits, starting with those typical of strong ties, with the family and friends (e.g. emotional and financial support), ending with weak ties, particularly appreciated by Granovetter, providing valuable information, useful in the implementation of entrepreneurial management of a small business. According to Greve and Salaff (2003), people use various networks for different purposes. Relationships with people related to business, universities and research institutions, consultants and associations of an economic type are used to acquire new ideas. Relationships with the family, friends and acquaintances can be the source of support and resources.

EN can be the source of information and resources which contribute to an increase in the level of individual EO dimensions and exploiting opportunities. Entrepreneurs regularly communicating with their EN members and thus receiving valuable information and resources can build EO by increasing the level of innovativeness due to new ideas, increasing proactivity due to information allowing for creating the vision of the future for the purposes of operations ahead of competitors, competitive aggression due to certainty as for the valuable source of information and resources in the form of a personal network, risk propensity due to certainty as for possible support from the network members and autonomy due to an independent operation supported with information and resources coming from the personal network. The awareness of possessing a personal network itself and the opportunities to use it may stimulate entrepreneurship (EO).

While generally approaching the relationship between EN and EO, it is worth referring to the research conducted as an attempt to identify the factors encouraging individuals to take entrepreneurial actions. These factors are often related to specific individual differences, with their origin in the family background, education, age, gender or personal attributes. They include: the economic environment, culture and availability of resources. EN is a specific resource of entrepreneurs, binding them with the environment, which may affect the level of entrepreneurship.

Possessing the network and contacting the EN members provides entrepreneurs with vast and diversified market information, thus supporting the identification of new opportunities. However, as pinpointed by Shapero and Sokol (1982), at this point, it is necessary to perceive such an opportunity as feasible (possible to use) and desirable. This situation may originate from the network consisting of the family and friends, which is pinpointed by Greve and Salaff (2003). The entrepreneur's support in using new opportunities ahead of competitors may have its source in relationships with the family and friends providing, through EN, necessary resources, especially financial, human and technical (Johannisson 1988) as well as legitimacy, acceptance and credibility essential for materialization of opportunities (Carsrud, Johnson 1989).

Krauss et al. (2005) also indicate that EO is the psychological structure reflecting the intentions and tendencies of the organization main players to tasks and behavior associated with entrepreneurship. It represents the

framework of the mind and perspective of entrepreneurship. Wincent, Thorgren, Anokhin (2016) proved empirically that social capital contributes to entrepreneurship and entrepreneurial orientation itself is positively correlated with the relationship networking.

The hypothesis on the existence of the relationship between EN and the level of entrepreneurship, among others, results from the statement by Powell and Smith-Doerr (1994) that economic activities do not take place in void but they are embedded in the social network of relationships of a different type. Networks are also considered as an important component of entrepreneurial social processes (Anderson, Dodd, Jack 2010) and personal contacts of entrepreneurs may affect the decision on taking entrepreneurial activities (Lamine 2017). EO increasingly contributes to business results and those, in turn, depend on the level of social and business relationships (Khadhraoui et al. 2016).

In view of the above, personal networks may influence a decline in the perception of risk associated with the introduction of changes by providing credibility and moral support necessary to exploit new opportunities (Johannisson, Monsted 1997). Therefore, ENs generate cultural and emotional capital necessary for entrepreneurs in operations directed towards exploiting opportunities (Johannisson 2000), constituting the core of entrepreneurship measured as EO. Additionally, Aldrich, Rosen and Woodward (1987) noticed a positive relationship between contacts of entrepreneurs with people belonging to their network and starting a business activity. In this case, one may guess that the personal network is a valuable source of information and support which lead to an increase in the level of EO. In all the analyzed cases, entrepreneurs feel the support of their personal network. Entrepreneurs, under the influence of this support, are able to take a higher risk and take proactive actions more frequently. These features are simultaneously some of the dimensions of EO. In these conditions, the following hypothesis can be formulated:

The personal network of the entrepreneur has direct positive impact on the level of entrepreneurial orientation.

4.2 Research sample

The research was based on the method of conducting empirical studies using managerial perception (Miller, Friesen 1978) in which data are obtained using the questionnaire. The conducted research is exploratory, directed to the identification of the environment in which modern small enterprises operate. The respondents of the research were owners-managers of the surveyed enterprises. The research tool was spread among the randomly selected organizations. The research sample amounted to 129 small firms.

The majority run their business activity in cities (84.5%). The firms operating in the country constitute 15.5%. The youngest company is eight months old. The oldest one is 26 years old. The enterprises are both companies with self-employment, those not hiring employees and those employing even 46 people. On average, the level of employment in the surveyed companies amounts to 4 employees. 30.2% of the firms are production companies, 33.3% - trade companies 24% - service companies. The other 12.5% run their business activity in the field of the sectors: construction, hotels and restaurants, transport, storage and communication, education and agriculture, hunting and forestry.

4.3 Variable measurement

For the operationalization of EN, the measurement of the frequency of entrepreneurs' interactions with the members of their personal network was used (seven-point Likert scale). According to Tomski (2016), there were identified the member groups of individual sub-networks of ENs. As a result of the conducted factor analysis, two basic subnetworks of entrepreneurs were identified: the one including entrepreneurs' family members (NET_FAM) – strong ties and the one including other people (NET_OTH) – weak ties. High Cronbach's alpha for NET_FAM (0.71) and NET_OTH (0.93) allows the identification of high reliability of the suggested scales. Descriptive statistics for the variables NET_FAM and NET_OTH are shown in Table 1.

Table 1: Descriptive statistics for NET_FAM and NET_OTH

	N	Mean	SD	Median	Min.	Q25	Q75	Max.
NET_FAM	129	3.48	1.81	3.67	0.00	2.00	4.67	7.00
NET_OTH	129	3.93	1.64	4.10	0.00	2.80	5.20	7.00

Generally, entrepreneurs more often interact with network members including people outside the family. Entrepreneurs hold general discussions on issues related to business and the economy mainly with these people. Although differences in the frequency of interactions are small, still, more intensive contacts relate to the network of "OTHERS".

The measurement of EO was carried out using the tool proposed by Covin and Slevin (1989), based on 9 scales referring to innovativeness, proactivity and risk propensity (seven-point Likert scale). This tool is firmly anchored in theory, designed adequately to the specificity of small enterprises, coherent, ensuring measurement reliability. EO was operationalized using three on innovativeness (Cronbach's alpha 0.86), three on proactivity (Cronbach's alpha 0.86) and three on taking risk (Cronbach's alpha 0.92). While striving for the one-dimensional approach to EO, in the light of a very high value of statistics K-M-O=0.899, the factor analysis was conducted, following the Kaiser criterion. The factor analysis confirmed the sense of primary intentions based on the theoretical assumptions. All the questions were loading one dimension. Cronbach's alpha for the one-dimensional scale amounted to 0.95, which finally confirmed the homogeneity of the scale and its usefulness for the measurement of entrepreneurship in the surveyed enterprises. Descriptive statistics for this variable are presented in Table 2.

Table 2: Descriptive statistics for EO

	N	Mean	SD	Median	Min.	Q25	Q75	Max.
EO	129	3.81	1.69	3.56	1.00	2.44	5.11	7.00

In order to examine a pure, uninterrupted relationship between the explanatory variables and the dependent variable, the control variables were introduced into the model. The control variables were selected on the basis of the relationships between them and the endogenous variables. If there was no statistically significant relationship between the demographics variable and endogenous variables, the specific variable was not qualified as the control variable. In these circumstances, the period of existence (EXI) and the size of employment (EMP) were selected as the control variables.

5. Research findings

While aiming at the presentation of general characteristics of the empirical research results, the correlation analysis of the variables in the research model was carried out (Table 3).

Table 3: Correlation coefficients of the variables in the research model

	Mean	SD	SIEC_C_RODZ	SIEC_C_INNI	OP
NET_FAM	3.48	1.81	1.00	0.50	0.39
NET_OTH	3.93	1.64	0.50	1.00	0.57
EO	3.81	1.69	0.39	0.57	1.00

It was concluded that all the correlation coefficients are statistically significant. In order to verify the hypothesis, the regression analysis was conducted (Tables 4 and 5).

Table 4: The relationship between the dimensions EN and EO – the regression model evaluation.

	Value
R	0.605
R^2	0.366
SR^2	0.346
$F(4.124)$	17.914
p	0.000
Standard error of estimation	1.365

Table 5: The relationship between the dimensions EN and EO – regression model.

	b	SD	t(124)	p
ln(EXI)	-0.002	0.074	-0.030	0.976
ln(EMP)	0.187	0.084	2.226	**0.028**
NET_FAM	0.173	0.084	2.052	**0.042**
NET_OTH	0.398	0.095	4.207	**0.000**

The obtained results indicate that 36.6% of changes in the level of EO can be explained by the control variables and the network level. Networks positively affect the level of EO. These are statistically significant relationships. The parameter values are positive, i.e. along with an increase in the network level there is an increase in the level of EO. In the case of the network NET_OTH, this increase is higher than in the case of the family network (NET_FAM). An increase in the level of the family network by the value of standard deviation increases the level of entrepreneurship by 0.173 and the level of the network NET_OTH by 0.398 of its standard deviation.

Summing up the results, it can be concluded that the entrepreneur's personal network positively influences the level of EO, which allows for the statement that the previously formulated hypothesis was confirmed. The entrepreneur's personal network has direct impact on the level of EO. Entrepreneurs' interactions with their EN nodes contribute to an increase in the level of entrepreneurship perceived in categories of entrepreneurial orientation.

6. Discussion and conclusions

In the light of the conducted research, EO is subjected to the direct impact of entrepreneurs' interactions with their EN members. This impact relates both to the network of family members and the one including other people outside the entrepreneur's family. The higher the frequency of entrepreneurs' interactions with the network members the higher the level of EO. The impact on EO is, however, significantly higher, since twice as large, in the case of the network of people outside the family. A high level of EO is also associated with searching for information. The network created with people outside the family is richer in unique information. It can be concluded that the higher level is achieved due to the use of the personal network (entrepreneurs acquire information and support stimulating individual dimensions of EO because of it) the more the entrepreneur is equipped with entrepreneurial characteristics (revealed as EO). The results in this area are close to the ones published by Ripolles and Blesa (2005), who claimed that, in newly established companies, the frequency of entrepreneurs' contacts with the family and socio-economic environment affects the development of EO. Personal networks may influence a decline in experiencing the risk related to the introduction of changes by ensuring credibility and moral support, necessary to exploit new opportunities (Johannisson, Monsted 1997).

Social networks have the ability to facilitate or constrain the activities of people who are embedded in the network. As Klyver and Schøtt (2011) state, entrepreneurship research shows that social networks, among other things, affect opportunity recognition (Singh 2000), the vocational decision to become an entrepreneur (Davidsson, Honig 2003) and growth (Lee, Tsang 2001).

Therefore, it can be concluded that social capital is the material for the transformation of the social network into the company's resources. People create the structure of social ties generating the resources essential for achieving the company's competitive advantage and implementing entrepreneurship by exploiting opportunities, which is determined (and measured) by means of the EO construct. Westlund and Bolton (2003) pinpointed that already a hundred years ago J. Schumpeter was aware of the significance of social capital as the mechanism both supporting and impeding the entrepreneurial process.

As for decades, sociologists have been interested in how people's social networks influence their status attainment (Granovetter 1973), this study proves that social networks (ENs) influence EO. Both literature studies and empirical evidence confirm that such networks are of crucial importance for small firms at different levels of an entrepreneurial process.

The results of this study are inscribed in the suggestion of Covin and Wales (2019), who claimed that knowledge within the EO domain should advance most rapidly when ''tighter'' models - those demonstrating close causal adjacency between EO and its proposed antecedents and consequences - are investigated. However, it should

be noted that the results obviously relate exclusively to the surveyed group of entities and cannot be generalized.

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Strategies for Developing an Open Distance e-Learning Curriculum for an Information and Knowledge Management Programme: A Case of the Kingdom of Eswatini

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Abstract: The advent of information and communication technologies (ICTs) has brought about a fundamental and dramatic shift in the global educational system, which is constantly changing. This shift is manifested in various dimensions including Open distance e-learning (ODeL) where ICT is used as tools for teaching and learning. Thus, ODeL has become an integral part of the 21st century education and training as evidenced by its widespread and wholesome adoption by different LIS institutions. A literature review reveals that in Eswatini, Information and Knowledge management (IKM) education is not yet grounded in institutions of higher learning since only a few institutions offer the programme as a module not as a full course. The article discusses the critical needs for developing an ODeL curriculum for LIS schools in Eswatini. The discussion is rooted within the perspectives of the benefits of developing an ODeL curriculum that will provide accessibility to LIS education in the Eswatini; enhancing the quality of those programmes; as well as the cost effectiveness of the ODeL programmes. Additionally, it presents the strategies for developing an appropriate ODeL curriculum for the LIS schools in Eswatini. This article proposes a framework for developing an ODeL curriculum for IKM. Such a programme could be offered through the University of Eswatini to accommodate students within and outside the country. Thus, ensuring that Eswatini makes its indelible imprint on the global LIS Education and Training landscape.

Keywords: library and information science, information and knowledge management, open distance e-learning, curriculum, higher education, education, Eswatini

1. Introduction and background to the problem

The advent and rapid development in Information and Communication Technologies (ICTs), brought about a fundamental and dramatic shift in the global educational landscape. The reason was that the advent and transformation witnessed in ICTs ushered in recent technological, devices now used in educational sector globally. The purpose of applying ICTs in the educational sector was based on its effectiveness and efficiency in fostering service delivery. The increasing use of Internet worldwide as one of the components of ICTs is now a new phenomenon in open distance e-learning (ODeL). It has created several opportunities for lifelong learning characterised by costless high-quality education beyond time zones and physical boundaries (Sonwalkar, 2013).

According to Edegbo (2011), the adaptation of ICT by higher education institutions (HEIs) has changed the way and manner through which education is conducted. Edegbo (2011) asserts that, apart from the provision of opportunities in ODeL and collaboration, ICTs has paved the way for new pedagogical approach for independent learning. Students can communicate, create and share presentations in multimedia format. The interaction amongst colleagues and teachers is enhanced using technology etc.

Recently some of the LIS institutions in sub-Saharan Africa have been gradually providing training through the ODeL platform. For instance, the University of South Africa (UNISA), and Zimbabwe Open University (ZOU) have begun offering some of their programmes online. LIS institutions have been changing the course contents of their curricular, renaming departments, as well as programme and offerings (Jamaludin, Hussin & Wan Mokhtar, 2006; Ameen, 2007; Rehman, 2003). Similarly, LIS institutions are including in their curricula new modules such as Bibliometric and other Metric tools – ORCID, Innovative library services – Mobile Apps, Web 2.0 to 4.0, Big data, Cloud Computing, Artificial Intelligence (AI), Internet of Things, Gamification, Talent acquisition tools and retention, Learning technologies such as e-learning Platforms, MOOC, LMS, Swayam, among many.

Similarly, Islam et al. (2011) conducted an online survey to explore the global scenario of ODeL in LIS programmes. The researchers in their study examined 370 LIS programmes, their study revealed that 85 LIS programmes were providing degrees and other related certificates that comprises of certificate courses, diplomas, Bachelors, Masters and Doctoral programmes. Additionally, the study revealed that Blackboard or Blackboard Vista was the most often used ODeL platform in LIS institutions. Chowdhury and Chowdhury (2006) in their study examined the situation of ODeL facilities and the support given to LIS institutions in the United

Kingdom. The study revealed that all the concerned LIS institutions have adopted ICTs for ODeL, and some of the institutions used virtual learning environments (VLEs) for ODeL; while others used in-house systems. The LIS programmes throughout the world are adopting ODeL to provide education services (Shiful Islam et-al, 2011). Similarly, bringing courses or even the entire LIS programme online (through the Web) has become a widely accepted mode of delivering education (Chu, 2010).

Despite the intervention by several HEIs, the provision of IKM education and training is still an Achilles heel in Eswatini. The IKM programme is not yet solidly grounded in HEIs in Eswatini. The Institute of Development Management (IDM) was the only institution that offers LIS programme at an undergraduate diploma level. The University of Eswatini (UNESWA), which is the biggest institution of higher learning in the country has recently in august 2019 started to offer a degree in information science which has the modules in information and knowledge management. As a result, organisations in Eswatini either send their IKM professionals to other countries such as South Africa, Botswana and Namibia, the United Kingdom and Australia for training. The idea of sending employees out of the country for training is expensive for many organisations in Eswatini and it also paralyses operations during the absence of these staff members if there are no contingent measures to ensure continuity of work. Considering this situation in Eswatini, this study proposes a framework for developing the ODeL curriculum for the IKM programme. Such a programme can be offered through the UNESWA to accommodate students within and outside the country and thus ensuring Eswatini contributes to IKM education and training in Africa. It also takes into consideration the global requirements in ODeL in the digital age.

2. Contextual background

On April 19, 2018, King Mswati III, being the 5th royal king of the county of Swaziland announced that Swaziland would now be known as Eswatini. The name changed was driven by a desire to fully break from the country's colonial past, while ending international confusion between Swaziland and Switzerland. The change was part of the double celebration of fifty years of the country independence and Kind Mswati III who was also turning fifty years. Eswatini is a landlocked country in the eastern flank of South Africa, where it adjoins Mozambique. Around 70 per cent of Eswatini 1.1 million people is based in rural areas, with livelihoods predominantly dependent on subsistence agriculture. The Swazi economy is mainly driven by its membership of the South African Customs Union (SACU) and the Common Monetary Area (CMA) (UNICEF, 2018).

Education and training are regarded as the foundation of economic and social development in Eswatini; and the objective of the government is to provide education and training that is affordable, accessible and relevant to all Swazis. The main levels of education and training are primary, secondary and tertiary (higher education). Eswatini's higher education sector consists of seven institutions of higher learning including a publicly funded university, publicly funded polytechnics and specialised colleges, and privately funded accredited universities and colleges. Eswatini universities aim to teach research skills and inculcate a culture of research for personal, professional and social development. According to the 2019/20 budget speech, education and training continue to take a significant proportion of government expenditure was allocated (E3,543 billion) (Rijkenberg, 2019). Literacy (through basic reading and writing) in Eswatini is about 87.5per cent. Higher education in Eswatini is provided through the University of Eswatini (public university), private universities, colleges and training institutions.

3. Information and knowledge management education and training in Eswatini

There are many challenges of IKM education and training in which comprise how to make IKM education relevant and effective. It is no secret that the circumstances affecting IKM education and training in Eswatini have changed for the last years. There are numerous issues in this change. Kala, (2009) claims that advent and rapid of technology development in the discipline of information creation and dissemination, which includes the increasing use of computers, microforms, word processing equipment, and the use of lasers and a wide range of developments in the field of communications, including satellites. This technological change has continued to pose a challenge to IKM discipline. There are many challenges facing the IKM education and training in Eswatini which includes lack of adequate education and training institutions. It is noted that Eswatini has a notable number of LIS professionals trained and educated at various levels (certificates, diploma, degrees, masters and doctorate) in LIS and only few that have majored in IKM. Most are employed within the country by government, private sector and training institutions. Ever since IKM become a recognised and required profession in Eswatini, government and private sector have been sending prospective professionals for LIS higher education in other countries because of lack of such education in the country. Scholarships for prospective students have been

available for LIS institutions namely in the University of Botswana, University of Namibia, University South Africa, University of KwaZulu Natal and other universities outside Africa. The government, through the Ministry of Education and Training (MOET) and the Ministry of Public Service (MOPS), has been the main sponsor behind incumbent professionals who have been trained at postgraduate degree level. In Eswatini the Institute of Development Management (IDM) was the only institution which offers LIS programme at the undergraduate level until recently 2019 the university of Eswatini has introduced bachelor's in information science. The institutions are still inadequate in terms of standard and quality to meet the high intake due to the high demand for higher education in Eswatini. Since the LIS programme was launched at IDM in 2012 nobody has graduated with a degree to help to fill the human resources gap.

The general norm in Eswatini for pre-service training in LIS has been in service or attachment with functioning and recognised library or information centre to gain hands-on experience and improve the candidate's appreciation for profession before formal tertiary education. This is largely still the case, with most training professionals having previously served in registries and libraries first. The pre-training practice has ensured that many LIS professionals who complete their formal higher education in other countries have a secure job with their employer when they return to the country. Though, some LIS professionals search for better opportunities with other employers after formal higher education because of remuneration from the government.

The education and training of LIS professionals outside Eswatini have several benefits to the country. The country's populace has, for instance, the opportunity to educate in well-established and reputable LIS institutions while experiencing different social and cultural environments, which also contribute towards their personal development and growth (Ndlangamandla,2012). They may also establish out of the country contacts and networks that are necessary for their sustainable professional development. However, there are also some challenges. One challenge, as observed by Johnson (2007), is the relevance of the education and training received, which is often based on western programs and modelled on developed countries. Education and training outside the country may also increase dependence on the external environment and promote the notion that valuable training can only be obtained outside the country. Another challenge is that of cost, as education and training outside the country require a considerable amount of money, therefore limiting the number of LIS applicants that may access to education and training at a given time.

4. The rationale of developing an ODeL curriculum for IKM institutions in Eswatini

The development of an ODeL curriculum for LIS institutions in Eswatini is imperative in this era of the 4th industrial revolution. The implication of such development would incorporate new ideas and techniques and tools in the training and education of prospective learners who desire to enrol for IKM programmes. It would help LIS institutions in Eswatini to become compliance and embrace best practices of LIS profession. The development of an ODeL curriculum for LIS institutions in Eswatini would unveil the accessibility of IKM programme to prospective learners such that IKM professionals already working in the diverse sector in the country would deepen their knowledge and skills in IKM practices. Catherall (2005) pointed out that the practice of ODeL offers immense benefits to learners because of its convenience, flexibility, accessibility and cost-effectiveness. Kala (2009) also stated that the ODeL approach allows quick, easy and relatively cheap sharing of information and ideas with people across the world. Abu Bakar, Harande and Abubakar (2009) stated that ODeL has the potentials of providing quality education.

As earlier mentioned, the increase in demand for higher learning requires the need for the implementation of a vigorous ODeL curriculum, to cater to the needs of LIS institutions in Eswatini. Furthermore, the ODeL platform provides opportunities for prospective IKM part-time learners who may not have the chance to enrol in a formalised IKM programme in those LIS institutions. The ODeL can be regarded as an alternative to old-style instruction for learners who want to pursue a part-time postgraduate IKM programme, but who are hindered because of job responsibilities and time factor.

5. Strategies for developing ODeL curriculum for IKM programme in Eswatini

A proposed framework for ODeL Curriculum in IKM programme in Eswatini becomes essential due to the identified gap identified in the study. It was observed that the IKM is at its infancy, thus requiring growth and development in diverse ways. Besides it was noticed that the LIS field of study is not grounded yet in terms of curriculum development and review, adequate qualified lecturers, introduction and application and use of recent digital technology for teaching and learning, an affirmation of policy formulation and implementation

within the HEIs in Eswatini. These among other factors necessitate the author intended to propose a framework that could drive the ODeL curriculum in IKM programme in Eswatini.

This framework would open new opportunities for prospective IKM learners who wish to enrol with the University of Eswatini for the programme. This could also foster convenient approach for the varied lifestyles and busy schedules of individuals who desire to develop themselves. High school levels preparing for such opportunity could transitions into UNESWA by taking the online versions of university-level or advance placement courses that expected of first-year retention rates. This is other ways to attract students within the country and outside Eswatini. Adult learners could also overcome geographical barriers to this higher education by enrolling in flexible IKM degree programmes that do not dislocate them from work and home. Prospective students could be rewarded with better access to the University's ODeL offerings and support services through a single point-of-presence portal. This virtual consolidation of ODeL services alleviates confusion about where faculty, staff and learners and external users go for information and support. The campus community could also benefit from a realigned central to ODeL unit that offers better coordinated and excellent service and support to the learners. The University benefits from using these resources more effectively, taking into cognizance the advantage of economies of scale of preference. Considering this, the study designed a framework for developing the ODeL curriculum for IKM programme in Eswatini as shown in figure 1.
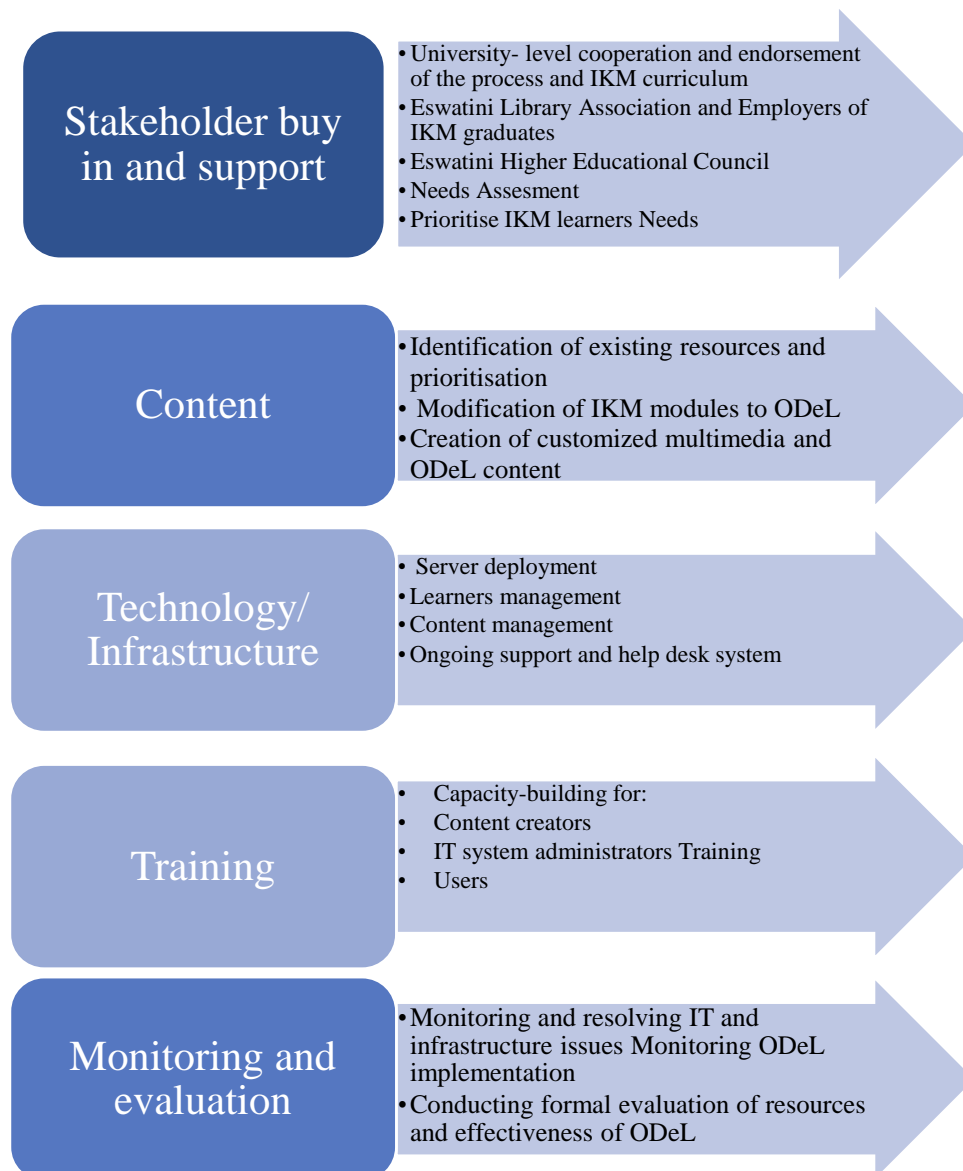
Figure 1: Framework for developing ODeL curriculum for IKM programme in Eswatini

6. Explanation of the framework

The framework explains what needs to be done by the University of Eswatini in preparation of an effective ODeL programme for IKM. The preparation process must be collaborative from the beginning with generating stakeholder buy-in and support and involving stakeholders in the entire curriculum development process. The IKM content should be relevant to Eswatini environment and translated/adapted appropriately. Technology must be accessible and acceptable to users. Training for end-users, implementers, and IT support personnel is an essential component of ODeL implementation. As with the programmes, monitoring is essential for measuring results and must be planned for each phase of the process. Periodic evaluations are necessary to implement changes and to improve programme effectiveness.

6.1 Stakeholder buy-in and support

Before developing the IKM curriculum the University of Eswatini should consider the current ODeL policy and regulatory environment in Eswatini. Review existing national or institutional documents for guidance before embarking on ODeL. If possible, stakeholders should be engaged such as Ministry of Education, Eswatini Higher education Council (EHEC), Eswatini Library association (EWALA), the employers of the IKM graduates. IFLA, ALA, and ALIA also recommend for the contribution of stakeholders in curriculum development.

6.2 Task team

The University of Eswatini should form a task force from the larger body of stakeholders who have enough specialist, capability, and knowledge to define the goals and plans for implementing the ODeL programme. The task force should be created and led by the university, and its members should be partners in and key stakeholders of ODeL. The task team will provide direction, identify and leverage available funding, and plan and support capacity development for ODeL. It can also help identify a technical working group to participate in providing technical support, reviewing and creating ODeL, and monitoring and evaluating progress

6.3 Needs assessment

The needs assessment should be conducted to identify infrastructure, personnel, and processes that need to be addressed to implement the IKM programme on ODeL. There is a need to also review ODeL policy and other related plans that might provide direction or guidance. The task team should identify key areas in IKM workforce development where ODeL can be implemented (i.e., in-service, pre-service, continuing professional development). The next step is to identify the best locations, partners, and institutions for the initial rollout plan for ODeL. The needs assessment should identify the following:

- IT infrastructure (supporting use of computing devices)
- Availability of electricity
- Availability of internet access (for regular synchronization of results)

6.4 Technology/IT infrastructure

For the curriculum to succeed, all the LIS institutions in Eswatini are expected to make adequate arrangement/installation of state-of-the-art ODeL technologies, infrastructures, and all other necessary teaching aids. These ensure proper curricular implementation. ODeL requires an IT infrastructure for both implementation and user support. IT infrastructure refers not only to physical elements of technology, such as computers and software, but also to the systems, processes, and people that support the full functioning and productive use of those elements for the ODeL system. Determining the modes of delivery of the ODeL programmes. The ODeL can be delivered in one of the following two modes (Chowdhury & Chowdhury, 2006):

(i) Synchronous e-learning: this is a computer-assisted e-learning environment where the instructor and the participants are involved in the course, class or lesson at the same time, through Web conferencing. While;

(ii) Asynchronous ODeL, is a computer-assisted training where the instructor and the participants are involved in the course, class or lesson at different times. For example, through Web-based training (WBT), e-mail, blogs and electronic bulletin boards. This method allows participants to access training materials at any time. Therefore, LIS schools in the Muslim World need to choose from any of the two modes.

The IT staff at the Department of Information Science will support LIS students and lecturers using the ODeL platform, importing the ODeL modules, syncing their data with the central server, and providing general troubleshooting and assistance.

6.5 Networking

Networking among the LIS institutions in Eswatini for cooperation. Further to this end, the networking among them would equally ensure consultation, and advice may be sought from each other regarding the experiences of the LIS institutions about the ODeL programmes. It is also expected that such networking would bring about an exchange of resources and technology in the LIS institutions.

6.6 Training

Another very crucial strategy is the need for training and re-training of the LIS faculty in the Eswatini, particularly, in relation to new ICTs and other emerging areas in the profession e.g. Bibliometric and other Metric tools – ORCID, Innovative library services – Mobile Apps, Web 2.0 to 4.0, Big data, Cloud Computing, Artificial Intelligence, Internet of Things, Learning technologies such as e-learning Platforms, MOOC, LMS, Swayam. Refreshing academic staff knowledge is a very critical factor in the success of ODeL programmes. A further strategy may involve the need for academic staff exchange among the LIS institutions in the Eswatini. This could bring cross-fertilization of ideas from the experiences of the academic staff in relations to the running of the ODeL programmes. Also, those LIS institutions that are advanced technologically may be required to provide a helping hand to those that are not so fortunate.

6.7 Monitoring and evaluation

What are monitoring and evaluation, why is it important and how is it applied in today work environment and educational sector

Monitoring and evaluation of the framework must be guided by evaluation plans and evaluation forms that analyzed the effectiveness of the learning design process and the ODeL system that supported pedagogy requirements. A further assessment of the learner has to must be carried out to ascertain the relevance of design and development techniques, the quality of the learning provided, method of instruction, layout, design and relevance of content. According to the development process, the learner's feedback must be analyzed, and subsequent changes referred to the development stage.

The review and improve stage proved functionally important at every step in the proposed pedagogical framework where systems were to be kept updated with:

- Learning trends, technology updates and research
- Increased ODeL awareness of learners
- Changes and developments in policy and curriculums
- Technology and infrastructure changes
- Suggested improvements or enhancements based on objectives or stakeholder requirements

Reviews of the system and subsequent improvements took place from the foundation the dimension through the Curriculum stage in the proposed framework. The aim was to manage enhancements through the cyclic dimension in maintaining a structured approach. The role of the cyclic dimension was imperative and considered changes in stakeholder requirements, objectives and included comments and outcomes received through the assessment and feedback. The proposed framework through the review and improve stage recommended that based on the complexity of the change, the request be addressed through the curriculum stage, maintaining structure in requested changes to the system.

6.8 Implementation of the LIS curriculum

The implementation of the LIS programme requires proper planning (including the application for research), training, implementation testing, dissemination, formative evaluation, ongoing user support, and addressing any technical issues. The University should consider the following summary of steps.

6.9 Planning

In preparation for IKM programme implementation, it may be appropriate to develop a research plan and submit to local ethical review boards, to disseminate or present results of the IKM programme to a wider audience.

6.10 Training

The university must train everyone who will be involved in the implementation of the IKM programme, including IT staff, Lecturers, and users. Guidance must be provided on how to access the help desk, call line, and other IT support. Lecturers and students must be able to get their questions answered easily, get any technical problems solved, and receive support for their implementation.

6.11 Piloting

The IKM modules must be piloted with a small group to identify issues/problems. Adjust as necessary. The piloting with a small user group and some lecturers to identify and solve any process or technical issues.

6.12 Dissemination

LIS course materials can include large files if they include video and multimedia. You might need to download and import the modules onto devices initially, while you train Lecturers or IT staff. The university must use stakeholder meetings, Eswatini Library association (EWALA) meetings, media, and other forums both to distribute IKM promotional materials and to share information about the LIS programme and how to access information or participate.

6.13 Ongoing support

Ready support for Lecturers, students, and IT personnel is critical, especially in the early stages of the project. There must be a dedicated telephone number, e-mail address, or access to live support to ensure that technical issues and other questions are addressed and answered. IKM lecturers should monitor on a regular basis, such as weekly, to determine how students are progressing with their modules and answer any questions. This includes managing the help desk or the support system established to document problems that need to address.

6.14 Challenges of development of an ODeL curriculum

Although the development of an ODeL curriculum for IKM programme will assist in enhancing teaching and learning in a flexible and cost-effective manner, they could be several challenges. Abubakar and Hassan (2015) identify those challenges as follows:

6.15 Technology challenges

Technology is a basic requirement for the development of any prospective ODeL programme, and this is due to the fast-changing nature of the technology which keeps on changing by the day. Therefore, to ensure the successful implementation of the ODeL programmes in the LIS institutions in Eswatini, it requires proper hardware and software must be provided, in addition to an adequate number of computers, Internet access, audio/video, as well as a robust LMS system.

6.16 Personnel challenges

Another critical challenge is the need for highly qualified staff who will be expected to be keeping up-to-date with new skills and knowledge in ICT. Thus, it is worth mentioning that ODeL programmes cannot thrive if the institution running it lacked skilled manpower. Therefore, there is a need for highly skilled personnel to run the programmes.

6.17 Administrative and financial challenges

The success of the implementation of the ODeL programme rests on proper administrative and financial support, without which no meaningful progress can be recorded in that regard. Thus, to ensure the success of the ODeL programmes in the IKM institutions in Eswatini, adequate administrative and financial support must be provided by the respective parent bodies of the IKM institutions

7. Conclusion

The study analysed the implementation of the IKM programme in Eswatini. The literature review was conducted to demonstrate the need for a framework to implement IKM programme through ODeL environment in Eswatini. It emerged from the analysis in the study that few HEIs in Africa offer IKM programme in the ODeL platform to cater to students who are already engaged in full-time employment in the corporate world. In Eswatini two institutions IDM and UNESWA offered the IKM programme in full time. Since this programme was offered fulltime-it was not convenient for prospective students undertaking full-time employment as lessons clashed with their work schedules. Furthermore, the offering of the IKM programme through the contact sessions only limits the involvement of foreign expertise from neighbouring countries and abroad. Such a situation further aggravated the challenge of shortage of qualified IKM practitioners in both the private and public sectors. Based on the analysis and the status of the IKM programme in Eswatini the study developed a framework for implementation of the IKM programme in an ODeL platform. The study proposed that this framework should be implemented by the UNESWA through engagement with the stakeholder community. UNESWA has adequate resources necessary for the implementation of the proposed framework. Offering ARM programme through ODeL environment at UNESWA will go a long way in ensuring that upcoming local Eswatini academics in this field are mentored virtually and be able to sustain the programmes. The limitation of this study is that it used only a literature review to justify the need for development of a framework for offering of IKM programme through ODeL in Eswatini. A further empirical study on the analysis of IKM education needs is recommended.

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Institutional Environment of Social Innovation Development

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Abstract: The institutional environment for social innovation is a set of institutions, institutional mechanisms and institutional agreements that dictate the terms of the interaction between economic agents at all stages of the socio-innovation process. The goal of the present study to develop an institutional environment assessment methodology through the systematization of institutions and their assessment. We provide the most common criteria for the systematization of institutions: the level of implementation, the sphere of implementation, the scale, relation to state and-territorial formations, industry type, performance assessment, management functions, the place of origin, the degree of impact, and the nature of impact. On the base the systematization, we have identified institutional issues in the development of social innovation, where we relied on practical information about social innovation gathered from the Forum for Social Innovation in Regions; we also used the works of scientists dedicated to the systematization of institutional traps.

Keywords: social innovation, institutional environment, social innovation development

1. Introduction

The contemporary socio-economic space exhibits a high degree of variability. A change is observed in the needs of society, both in terms of tangible and intangible benefits. In this regard, the set of goods consumed by different social groups varies significantly. As a consequence, the majority of economic models aimed at meeting the needs of the population have rapidly become outmoded and ineffective. In this context, particular importance is attached to social innovation that generates new and more effective ways of creating benefits at the lowest cost. Social innovations are starting to play an effective role as a tool for improving social welfare (Moore, 1995; Battistella C., Nonino F., 2012).

The growing interest in this issue, both from the scientific community and from practitioners, may be referred to in terms of a global trend. However, the research community has not yet coalesced around a unified concept in this area, despite some aspects being presented in the works of Mulgan et al. (2007), G. Phils (2009) and M. Moore (1995). An example of a large-scale research project encompassing the various aspects of innovation in the public sector is implemented in the European Union in the 2003-2006 research project entitled PUBLIN (Koch P., Cunningham P., Schwabsky N., 2005; Koch P., Hauknes J., 2005).

The above-mentioned fact shows that the indicated line of research is at the beginning of its development. An important question is: what position does this phenomenon occupy within the socio-economic system and what institutional environment affects (Dekker, 2009; Urs P. Jager, Andreas Schroer, 2014; Jäger, 2012)? The answers to these questions will not only reveal the basic features of social innovation, but also determine the characteristics of public management initiatives supporting the development of social innovation (Cooney, 2006).

It is no coincidence that in a period of crisis there is a surge of interest in social innovation. Working out the mechanisms for involving individuals in the development of the social sector is an effective way to increase people's social satisfaction, which is beneficial for their welfare and for socio-economic development in the territory under consideration. B.A. Erznkyan notes that "the social, by definition, cannot be imposed from above, it can emerge – under certain conditions, and sometimes spontaneously, in spite of all the conditions – only from below, as an initiative, if not of the masses, then of individuals, of citizens". Thus, the author calls the very process of shaping the social sector "cultivation" [Erznkyan, 2005]. "Cultivation", in turn, involves shaping the institutional environment, institutional arrangements, socioinnovative activity of separate groups and specific individuals.

Hence, the aim of this paper is to develop an institutional environment assessment methodology through the systematization of institutions and their assessment. To advance this aim, a review of approaches to the definition of "social innovation" is carried out, considering the theoretical and methodological principles of economic theory, enabling a determination of the main parameters of the systematisation of social innovation institutions and presenting the assessment of the institutional environment of social innovations that highlights the main features of its institutional development.

2. Approaches to the definition of social innovation

One of the most generally accepted definitions of social innovation was provided by Mulgan et al. (2007). The authors define social innovation in terms of "new ideas working to achieve social objectives". However, this definition does not reflect the essential characteristics of social innovation or show where it contrasts with innovation in general. Often, business innovation contributes to the obtaining of an economic benefit in the form of profit, as well as the attainment of social goals.

G. Phils (2009) understands social innovation to consist of any new and useful solution aimed at meeting social needs. The main weak point in this definition is that it is based around the utility requirement of social innovation. However, in practice, the effects of innovation can be unpredictable.

R. Heiscala (2007) understands social innovation to refer to changes in the cultural, legal and regulatory structures of a society that increase its collective power resources, as well as improving social and economic performance. The main value of this definition is the reference to "increasing the collective power resources". Furthermore, the author understands social innovation not as an idea, but as a transformation that creates an alternative approach to the determination of the essence of social innovations (Gonzalez-Padron T., Tomas G., Hult M., Calantone R., 2008).

The concept of "social innovation" closely resembles the concept of "innovation in the public sector" – "Innovations in the public sector are new ideas, the embodiment of which lead to an increase in social value". However, these definitions can be deceptive, implying that social innovation is one of the types of innovation that is aimed primarily at social needs (Koch, Hauknes, 2005; Koch et el, 2005). Summarising the results of researchers, as well as taking into account the original approach to the definition of the term, it may be disclosed that social innovation possesses the following main general features: a certain level of novelty; implementation in the social space; and a focus on improving the performance of contemporary activities aimed at solving social problems.

On the basis of the analysis, a list of the characteristics inherent in social innovation was formulated. Among these characteristics are included:

- innovation;
- overcoming institutional inertia;
- focus on solving social problems.

Based on these characteristics, the authors have proposed the following definition of social innovations.

Social innovations are new models for solving social problems that contribute to overcoming the current institutional inertia.

Institutional inertia is the stability of the system of institutions that define the framework for the interaction of economic agents regarding the production, distribution, exchange and consumption of goods.

Despite the fact that there is no single approach to the study of social innovation, it may be observed that the views of the majority of researchers coincide; for example, as regards the connections between social innovation, social value, activation of human potential, provision of public goods and improved quality of life(McElroy, 2002; Fafchamps, 2006).In taking these aspects into account, the proposed definition of the term thus distinguishes social innovations from other types of innovation. We additionally observe that social innovation is an important instrument for territorial development in the knowledge-based economy.

The development of social innovation is also determined by the effectiveness of regulatory and supportive rules and regulations that form the institutional environment in which social innovators operate. Due to the fact that the incentives of social innovators are largely non-commercial, a special role in the development of this type of activity lies with the state, creating conditions for their effective functioning. This studyconsiders the proposed approach of the institutional environment assessmentin more detail.

3. Methodology

In this study, in order to develop a methodology for assessing the institutional environment of social innovation, it has been applied methods of multiparameter classification, and expert appraisal. It is necessary to notice that the quantitative measurement of institutions is a difficult and debatable problem. The vast majority of modern researches use only descriptive method; however, our design of the research makes possible to quantitative measurement of social innovation institutions. The method of multiparameter classification was used since this method allows systematizing institutions according to the developed criteria, which raises the possibility to identify not only inefficient institutions but also determine by which criteria the weaknesses are observed. During the further analysis, this approach allows for governance, not a specific institution, but a whole group of institutions (Popov et el, 2017). Using of opinions of institutions' users and assessments of experts as a method of measuring institutions is widely used in the Governance Matters project, and is also justified in the work of A. Baranov et al. (Baranov et el, 2015). As a result, the research procedure includes three main stages.

At the first stage, a list of criteria for the systematization of institutions, was proposed and justified,which formed the basis for developing a model of the institutional environment structure. At the second stage, within the framework of the analysis of social innovations' institutional environment it has distinguished 58 major economic institutions, which represented in the scientific literature and confirmed by existing regulatory and legal acts. These institutions are based on legislative acts (the Constitution of the Russian Federation, the Civil and Labor Codes, Decrees of the Government and the President of the Russian Federation, regional legal acts, etc.).The third stage, the systematization and evaluation of the identified institutions was carried out.Since the civil initiatives play a special role in the production of social innovations (Popov, 2016), we focused on such forms of social innovation as social entrepreneurship, social cooperation, NGOs, charitable projects and socially oriented business.For the analysis of the quality of institutions, we used the method of expert evaluation. The experts were top managers of twenty organizations which produce of social innovations in Ural region. The experts included four representatives of socially oriented business, social entrepreneurship, social enterprises, NGOs and charitable organizations. The experts asked to evaluate each of the 58 institutions represented on a 5-point scale (1 - the institute is missing or ineffective; 5 - the institute functions perfectly and efficiently).

4. Results

4.1 The model of the institutional environment structure of social innovation activity

Institutional environment for social innovation is a set of institutions, institutional mechanisms and institutional agreements that dictate the terms of interaction between economic agents at all stages of socio-innovation process. Institutional environment can promote the development of social innovation projects or hamper their implementation; it can act as a catalyst for social innovation and as a barrier to the implementation of social innovation projects. In order to get a more detailed understanding of the content of institutional environment for social innovation, we have looked into several approaches to systematization of institutions, applicable to this type of activity. It has been following criteria for the systematization of institutions.

The first criteria are the sources of social innovation. In general, any organization or cooperation that creates social value can act as a source of social innovations. It is important to note that the formation of social innovations is affected by the social mission of the organization and commercial activity. D. Young (2014) highlighted that it is necessary to harmoniously combine social mission and commercial activities for the sustainable development of organizations capability to create social values within the market economy conditions. The scientist identified the following forms of social innovations' implementation: socially oriented business, social entrepreneurship, social enterprises, non-profit organizations, publicly funded organizations, charitable projects. The second criteria is the type of resources, which includes labor, information, financial and production. It is necessary to note that labor are considered here as an intellectual resource(Popov, 2015) The third criteriaare phases of the social innovation process. The innovation development cycle (Schumpeter, 1911) consists of three phases: invention, innovation, diffusion. During the invention phase, a prototype of a new

product (services, technologies) is formatted, where a new method of applying existing knowledge is used; this prototype is a basic model of innovation. Within the innovation phase, this model is introduced to the economy. Diffusion phase refers to the spread of innovation by copying it or creating a similar product. S. V. Kortov (2003), who developed J. Schumpeter idea, identifies such the innovation process phases as invention, imitation, and adaptation. The invention phase includes the determination of rights to knowledge, the assessment of its value, the transformation process of knowledge into an object and the establishment of a monopoly right to an object. Imitation phase provides diffusion of innovation by copying products or the production cycle replication. The process of adaptation involves the innovation transformation according to the changing consumer preferences that are caused by social, economic, political or technological development (Kortov, 2003). According to "The Open Book of Social Innovation" (Caulier-grice, Mulgan, Murray, 2010), it is highlighted the six phases of the social innovations process: motivation, suggestion, testing, preservation, scaling, and systemic change. Social innovation is seen here as an impulse that leads to significant social change.

From our point of view, all noticed approaches have weaknesses. For instance, the first and second approaches don not pay enough attention to the initiation process, which plays an essential role during the social innovation creation. Within the last approach it has not demonstrated the features of the institutional environment for shaping social innovations as well as the demand for social innovations, and adaptation to rapidly changing realities or new areas of coverage.We distinguish four phases of the social innovation process: initiation, invention, imitation and adaptation. Crisis phenomena in economic processes, unfavorable economic and political situation on the world stage, various failures both in government and in the private sector serve as a driving force for socio-innovation development. These phenomena trigger the initiation of social innovation. Governmental structures, social entrepreneurs, socially oriented non-commercial organizations, and ordinary citizens faced with a specific problem – all these categories can act as potential social innovators. At the stage of invention the developer shapes his idea in a concrete form: prepares the project, basic documentation, project team, etc. After that, the idea, having been put in one form or another, goes to the next stage. Imitation stage includes the spread of the innovation among consumers, and also copying the proposed solutions in other territories or by other economic actors. An important role at this stage belongs to the diffusion and reproduction of innovation (Owen, 1992). Here social innovation can cause change in socio-economic systems that will influence social movements, business models, laws and regulations, infrastructure; it can also change the way people think and act. The needs of society and specifics of socio-economic systems are constantly changing. In this regard, social innovation has to adapt to these changes. Such "revival" is part of adaptation process, and the life cycle starts again.
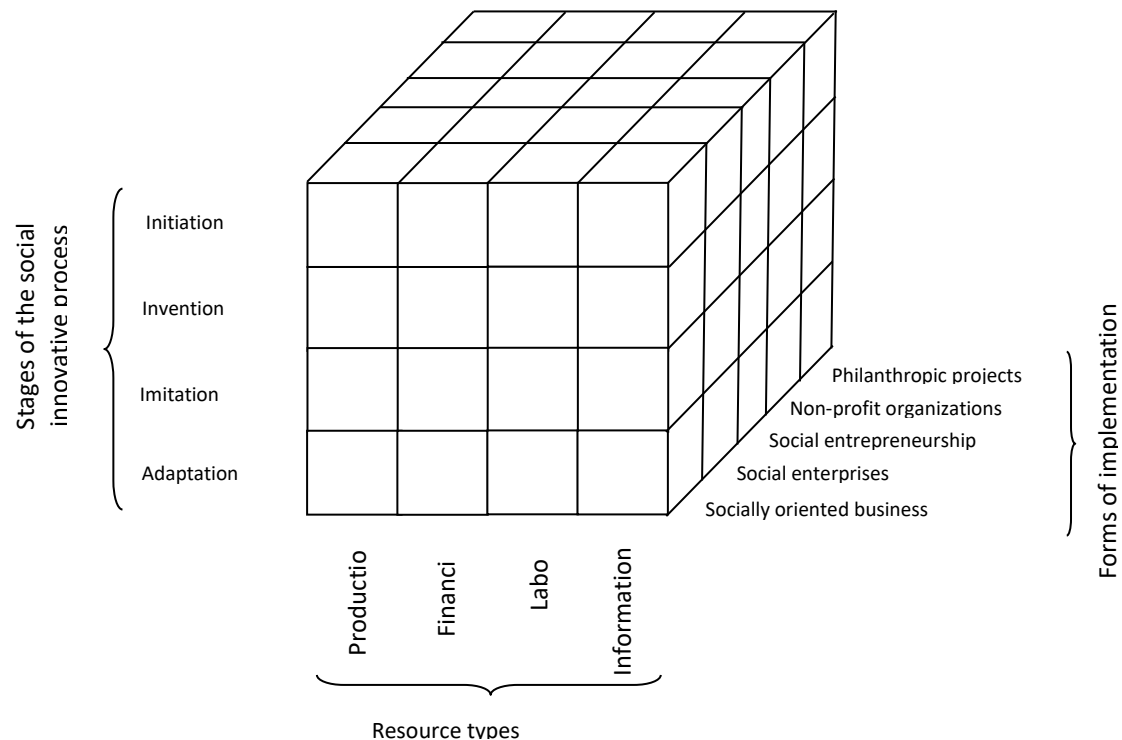
Figure 1: The model of the institutional environment structure of social innovation activity

Figure 1 shows the structure of institutional environment for social innovation development as a cube, in which each plane reflects one of the above criteria. In general, the cube contains 80 different combinations, that shows the presence of rules and regulations with the characteristics indicated, or, on the contrary, the presence of gaps in this type of activity (Popov et el, 2017).

4.2 Assessment of the institutional environment of social innovations

In the process of analysis of scientific literature and legal acts that force in this territory, it has been formed a list of 58 institutions that have an impact on the development of social and innovative activities (Table 1). The results of the analysis showed that the scores of most institutions (41 out of 58) fluctuate within three points out of five. Only four types of institutions received higher scores than average that are institutions of taxation, higher education, basic education, and retraining of personnel. Thirteen institutions received critically low scores (below two points), which includes institutions of advanced training, public-private partnerships, legal protection, anti-corruption, interaction with authorities, trust in authorities, innovation clusters, innovation funds, investment, generation of ideas, expert consulting support, financial support for innovation, financial support for (social) entrepreneurship. The full results of the analysis are presented in the table. 1 (100% corresponds to 5 points). Among the institutions for human capital development, higher education, basic education, and professional development received marks above the average. Evaluation of the Institute for professional development was critical (36%). The remaining institutions showed an average score.

Table 1: Assessment of social innovations institutions

Number	Institution	Score	Number	Institution	Score
1	Spread of the knowledge	54%	**30**	**Expert-consulting support**	**35%**
2	Higher education	71%	**31**	**Financial support of innovations**	**32%**
3	Basic education	63%	**32**	**Financial support of (social) enterprise**	**37%**
4	Research staff training	51%	33	Information support	43%
5	Healthcare	49%	34	Idea reduction	46%
6	Migration policy	49%	35	Facilitation (in authorization and patenting)	43%
7	Retraining	60%	36	Innovation deploying	43%
8	**Professional development**	**36%**	**37**	**Idea generation**	**34%**
9	**Public-private partnership**	**37%**	38	Citizens involvement	43%
10	Regulation of entrepreneurship	49%	39	Nonprofit organizations' regulations	46%
11	Strategic policy	49%	40	Social cooperation	43%
12	Employment	49%	41	Social development	49%
13	Information Security	49%	42	Population self-employment	43%
14	**Legal protection**	**35%**	43	Autonomy	40%
15	Contractual relationship	43%	44	Trust between population	51%
16	Activity supervision	54%	45	Crediting	49%
17	**Anti-corruption**	**31%**	**46**	**Investment**	**38%**
18	Private ownership	46%	47	Microfinancing	51%
19	Development programming	49%	48	Consolidating financing	46%
20	Promotional activities	40%	49	Science financing	49%
21	Monitoring	49%	50	Finance mediation	43%
22	**Liaising with authorities**	**38%**	51	Tax assessment	60%
23	Transfer of technology	49%	52	Support of small and medium-sized businesses	49%
24	Provision of public goods	51%	53	Search of partners and counter-agent	49%
25	Provision of club goods	49%	54	Science and business integration	49%
26	Population needs identification	43%	55	Labor unions	51%
27	**Interaction with authorities**	**31%**	56	Targeted support	43%

Number	Institution	Score	Number	Institution	Score
28	**Innovation clusters**	**33%**	57	Insurance	51%
29	**Innovation funds**	**37%**	58	Trade	54%

Government institutions received rather low marks. Fourteen institutions showed average scores, and four - critically low (institutions of public-private partnership - 37%, legal protection - 35%, anti-corruption - 31%, interaction with authorities - 38%, trust in authorities - 31%). In this block, the largest number of institutions with critically lowscores turned out to be.

In the block of institutes of innovation infrastructure, critical importance was shown by institutes of innovation clusters (33%), innovation funds (37%), financial support for innovations (32%), financial support for (social) entrepreneurship (37%), expert and consulting support (35%), and generating ideas (34%).

Estimates of civil society institutions were quite acceptable; they all showed a satisfactory level of development. Meanwhile, the institutions of financing and business development were above the critical level.

On the basis of the obtained data, a system of the institutional environment for social innovations has been constructed, and areas requiring additional development has been identified. The numbers presented in the table. 2, correspond to the numbers assigned to institutions (see Table 1); institutions with critical scores presented in bold, institutions whose assessment was quite high has underlined. Most of the institutes received marks within 3 points. As can be seen from the table. 2, the largest number of underdeveloped institutions falls on the distribution of information resources. The most problematic areas are the information resources institutions of a social enterprise and a socially oriented business; here it is necessary to highlight the institution of trust in the authorities, as well as the institutions of innovation funds, expert consulting support, and interaction with the authorities.

In the sector of financial resources of social enterprises, there is a concentration of following institutions with a critically scores: institutions of financial support for innovation, institutions of financial support for (social) entrepreneurship, investment institutions.

Institutions, which related to the production sector (capital resources), showed an average score, with the exception of institutions generating ideas and public-private partnerships; the underdevelopment of these institutions affects the initiation phase.

In the sector of labor resources, only the institutions of advanced training, which affects the entire social and innovation process, showed critical underdevelopment.

Table 2: The assessment of institutional environment structure of social innovation activity

		Initiation	Invention	Imitation	Adaptation
Socially orientated business	Production resources	36,**37**, 23,24,25,9, 15,16,18,19,20,21	24,25,20,14,17	**9**,10,11,24,25	24,25,23,<u>51</u>,20
	Financial resources	**9**,10,11,20,**45**,45,46,48 ,<u>51</u>,**29**	**9**,10,11,20,**45**,45,46,48 ,**29**	**9**,10,11,20, **45**,45,46,48,<u>51</u>	**9**,10,11,20,**45**,45,46,48
	Informational resources	1,41,**27**,44,**30**,32,53, **22**	1,41,**27**,44,**30**,33,54,55 ,13, **22**	1,41,**27**,44,**30**,33,53,13 , **22**	1,41,**27**,44,**29**,33
	Labor forces	<u>2,3</u>,4,5,6,7,**8**,12	<u>2,3</u>,4,5,6,7,**8**,12,38,40	<u>2,3</u>,4,5,6,7,**8**,12,38,40	<u>2,3</u>,4,5,6,7,**8**,12,38,40
Social entrepreneurship	Production resources	36,**37**, **14**,15,24,25,52,54,49,33	24,25,20,52,<u>58</u>	53,25,52,<u>58</u>	23,24,25
	Financial resources	31,32,**45**,45,46,48,<u>51</u>,**29**	31,32,**45**,45,46,48,**29**,56	31,32,**45**,45,46,48,<u>51</u>,**29**	31,32,**45**,45,46,48,**29**
	Informational resources	1,41,**27**,44,**29**,33,55,34 ,35	1,41,**27**,44,**29**,33,55,34 ,35	1,41,**27**,44,**29**,33,55,34 ,35	1,41,**27**,44,**30**,33,55,34 ,35
	Labor forces	<u>2,3</u>,4,5,6,7,**8**,12	<u>2,3</u>,4,5,6,7,**8**,12	<u>2,3</u>,4,5,6,7,**8**,12	<u>2,3</u>,4,5,6,7,**8**,12

		Initiation	Invention	Imitation	Adaptation
Social enterprise	Production resources	24,25,52,54,49,34	24,25,20,52	53,25,52	23,24,25
	Financial resources	**31,32,45**,45,46,48,50,<u>5</u><u>1</u>	**31,32,45**,45,46,48,56	**31,32,45**,45,46,48,51,<u>5</u>6	**31,32,45**,45,46,48
	Informational resources	1,41,**27**,44,**30**,32,55,32,**17**	1,40,**27**,44,**30**,32,55,32,56	1,40,**27**,44,**30**,32,55,32	1,40,**27**,44,**30**,32,55,32
	Labor forces	<u>2,3</u>,4,5,6,7,**8**,12	<u>2,3</u>,4,5,6,7,**8**,12,38,40	<u>2,3</u>,4,5,6,7,**8**,12,38,40	<u>2,3</u>,4,5,6,7,**8**,12
Nonprofit organizations	Production resources	36,**37**, 24,25,38,54,49,33	24,25,20,39	53,25,39	23,24,25,39
	Financial resources	50,39, **45**,45,46,48	50,39, **45**,45,46	50, 39, **45**,45,46	50,39, **45**,45,46
	Informational resources	1,41,**27**,44,**29**,33,55,39,35,13	1,41,**27**,44,**29**,33,55,39,35,13	1,41,**27**,44,**29**,33,55,39,35,13	1,40,**27**,44,**30**,33,55,39,35,13
	Labor forces	<u>2,3</u>,4,5,6,7,**8**,12	<u>2,3</u>,4,5,6,7,**8**,12,38,40	<u>2,3</u>,4,5,6,7,**8**,12, 38,40	<u>2,3</u>,4,5,6,7,**8**,12
Philanthropic projects	Production resources	36,**37**, 24,25,52,54,49,39	24,25,20,52	53,25,52	23,24,25
	Financial resources	**45**,45,46,48	45,45	**45**,45,46,48	**45**,45,46,48
	Informational resources	1,41,**27**,44,**30**,333,55	1,**30**,41,**27**,44,53,55	1,**30**,41,**27**,44,53,55	1,**30**,41,**27**,44,53,55
	Labor forces	<u>2,3</u>,4,5,6,7,**8**,12	<u>2,3</u>,4,5,6,7,**8**,12,38,40	<u>2,3</u>,4,5,6,7,**8**,12,38,40	<u>2,3</u>,4,5,6,7,**8**,12

5. Discussion

The presented research design, which allowed to obtain the results, develops the methodological apparatus of measuring institutions and shows the possibility of measuring institutions in social and innovative activities.

The Institute of professional development (Hubert, 2010; Lloyd, 2004) was the least developed in the block of institutions for the development of human capital. This suggests that cost-effective business entities should be fairly low. The level of development of the market for advanced training services is also very important. Moreover, it is necessary to ensure the availability of these services for social workers who are potential social innovators. An analysis of the institutions of the public administration block (Khutrakun, 2013; Lettice, 2010; Moore, 2001; Sanders, 2008 et el) showed that there are a number of problems in this area as well. First, low assessments of institutions for legal protection and anti-corruption (Polterovich et el, 2006; Popov, 2015; Furubotn et, el, 2005; Gertler, 2010) indicate the need to increase the transparency of government activities. This will reduce corruption and increase the degree of compliance with laws. One of the directions of development can be a complete transition to the provision of services in electronic form, which implies a high level of development of information support institutions. Secondly, the institutions of public-private partnership (Jensen, 2008; Lettice, 2010; Khutrakun, 2013) and interaction with the authorities (Polishchuk, 2011; *McElroy*, 2002) turned out to be undeveloped. State cooperation with the private and third sector in the field of social innovation is in its infancy. A possible way out is seen, in particular, in the deregulation and red tape reduction of relations between the authorities and society, which will allow the state to involve various sectors in solving social problems. We emphasize that the state should set a vector in these relations, for example, form tax incentives for the private sector in the process of producing social innovations, encourage civic cooperation, develop infrastructure for social entrepreneurship. These measures will have a positive effect on the development of the institution of trust in government. The assessment of most of the institutions for the development of innovation infrastructure was also critical. This demonstrates an undeveloped platform of not only social but also technological innovation. In this regard, it is advisable to develop an innovation infrastructure that will serve as a platform for the creation of innovation clusters, the formation, and support of innovators. However, so far the speed of implementation of relevant projects is extremely low. You can talk about positive developments in this area, mainly in Moscow and St. Petersburg. To improve the efficiency of problem institutions of the innovation infrastructure (Antadze, 2010; Cressey, 2015; Mulgan, 2006) in other regions, it is necessary to develop innovation centers, hubs, and incubators. A special approach requires the development of

an investment institution in the field of social innovation (Antadze, 2010; Caulier-grice, 2010). The social sphere is not profitable, and economic agents are not a priori motivated to invest in this type of activity. In this regard, the creation of a system of incentives for investors is important: for private business, it may be tax incentives, for citizens - the production of private and public goods. The key point is the transparency of the social sphere, which would expand the idea of entrepreneurs and innovators about investment opportunities.

6. Conclusion

In this study, in order to develop a methodology for assessing the institutional environment through the systematization of institutions and their evaluation, the following results were obtained. First of all, a new approach to defining social innovations as new models for solving social problems that contribute to overcoming the current institutional inertia, is presented.

Secondly, the structure of the institutional environment of social innovation dividing institutions bytypesofresources (production, financial, labor, informational), sources of social innovations (socially oriented business, social enterprises, social entrepreneurship, non-profit organizations, philanthropic projects) and phases of the socialinnovation process (initiation, invention, imitation, adaptation) was proposed.

Thirdly, based on expert assessment, the results of measuring the institutions of social innovation in the Ural region are obtained and the most poorly developed areas in the institutional environment are identified.

Lastly, the inefficient institutions that hinder the development of social and innovative activities in the territory under consideration were identified, and the directions for improving the efficiency of existing institutions were proposed.

The theoretical significance of this study is to expand the existing provisions of the theory of innovation in relation to the public sector and the concept of social innovation. The practical significance of the results consists in identifying underdeveloped areas in the institutional environment of social innovation and identifying directions for the possible elimination of existing gaps.

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Promotion of Parenting Knowledge Through Social Media: Evidence From Russia

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Abstract: Social media is heavily integrated into all aspects of modern life, including the reproduction of human capital. Scientists traditionally denote socio-cultural factors as one of the determinants of the reproduction of human capital. Amid the digital revolution currently unfolding in Russia, these processes are reflected in a digital reality. Through this reflection we can see the pain points of the reproduction of human capital, debate issues related to these processes and forecast the future state of this capital. The paper is aimed at studying the pain points of parenting, as they are presented on Russian social networks. The research method was social media analysis. We chose the largest social network in Russia, VKontakte, which has 97 million active users and 9 billion daily views. We studied the community «Yazhemat» (meme term that translates as «I am a mother, after all»), which promulgates a wide spectrum of opinions about parenting. It has 1.5 million subscribers, which was to represent the volume of "passive reaction" to the content. The level of reader activity was tracked using the following indicators: 1) number of "likes" – a "like" taken to be an expression of solidarity and support for the post; 2) number of comments – the depth of the discussion and its intensity; 3) the number of reposts – the number of those who shared the post as an indicator of its online distribution. This is another form of approval, alternative to likes. As a result of the social media analysis, we arrived at the following results. The key categories discussed in parenting communities are the topics of lifestyle, upbringing, vindication, greed, mothers' rights and obscurantism. Detailed analysis of each topic will shed light on trends prevailing among young people in Russia today. We are certain that the values of parenthood are an important part of individual human capital. Our research has shown that the state must invest in promoting them. Understanding social norms and values related to family and parenting shared by young people on social media is crucial to creating engaging content, which can be leveraged on social networks to drive desirable behaviours.

Keywords: parenting, parenting values, motherhood, social media, human capital, Russia

1. Introduction

Social media has become heavily integrated into all aspects of modern life, including such private aspects as the reproduction of human capital. Young people are prolific social media communicators. Yet this type of exchange has no boundaries and is usually not personified, which enables young users to express judgments and assessments that they may not be able to share face-to-face. Studying social media communication is vital for researchers: the channels and content are at once a reflection of what is happening with young people and a key force shaping the underlying processes taking place in these communities. Accordingly, analysing the content of social networks today allows diagnosing and partly predicting the dynamic of the most pressing, and thus most widely discussed, social issues.

Social networks are a platform for groups of people to either unite or clash around some topic. Often communities spontaneously arise around "pain points" in different areas. Through social media one can track the discussion of pertinent issues, the vectors of opinions and specifics of subculture, ideas, particular humour and so on – they thus become a certain "information repository" on a particular social group or issue.

In recent years researchers from different countries have been turning their attention to social networks, accepting their significance as an instrument that influences the formation of human capital and people's behaviour. For example, the role of social media in the educational process has been proven (Toker and Baturay, 2019), as has its influence on people's psychological well-being (Nisar et al, 2019), self-induced behaviour change (Nabi et al, 2019), association with subjective well-being and specific personality traits (Brailovskaia and Margraf, 2019), victimization (Kokkinos and Saripanidis, 2017), interpersonal and sexual relationships (Yeo and Chu, 2017; Richman et al, 2017; Darragh et al, 2017; Sarabia and Estévez, 2016), and so on. It is widely agreed that social networks can be used as a marketing instrument (Baek, Ahn and Choi, 2012; Cheung and Lee, 2008) and a means of political influence (Akhtar and Morrison, 2019; Kim and Kim, 2019; Linvill et al, 2019), as well as a tool for sociological analysis (Smirnov, Sivak and Kozmina, 2016).

Research from different countries has shown that social media today are the preferred source of information about parenting and the formation of human capital in children (Setyastuti et al, 2019; Voroshilova, 2016; Boyd et al, 2019; Marasli et al, 2016). "Pain points" in the process of the reproduction of human capital have national specifics. At the same time, a study of their "reflection" in the mirror of digital reality (social media) allows us to talk about problems in these processes in particular countries, and also build forecasts about the future state of human capital for individual countries.

In our previous paper we looked at "pain points" of contemporary Russian parenting from the point of view of pro-parenting communities in social networks (Voroshilova, 2016). To receive a more comprehensive understanding of the process of the reproduction of human capital we tried to look at parenting from the opposite side, through communities that in one way or another disapprove or make fun of a family and children-oriented lifestyle. This defined the aim of this paper – to research to the culture and "pain points" of parenting, promoted through Russian social networks in communities that have a negative view of traditional processes of the reproduction of human capital.

2. Data and methods

2.1 Choice of social network

The scope of our research was the largest social network in Russia and the CIS, Vkontakte (the so-called "Russian Facebook"). It has the largest research (97 million active users, 9 billion daily views), mostly citizens of Russia and CIS countries. According to internet analytics data, around 90% of 16 to 35-year-olds in Russia use this social network.

2.2 Community choice and characteristics

This social network has a plethora of communities centred on particular ideologies or movements that relate to the reproduction of human capital. Examples include feminism ("Feminism on show", "Female republic | Feminism", "Overheard Feminism"), childfree ("Overheard Childfree", "Childfree", "Russian Childfree"), LGBT ("Russian LGBT community", "Children 404. LGBT teens", "Russian LGBT network").

Another category of communities is characterised by content that conveys attitudes that oppose traditional processes of the reproduction of human capital, a pro-motherhood and childhood culture. Their names are usually based on an enduring internet meme loosely translated as "I am a mother after all" ("Ya zhe mat" in Russian, hereinafter we use the Russian transcription in reference to the community). Seven such communities have over 50,000 members. Posts in these groups are usually about questionable parenting practices, excessive rights for children and mothers, questions about the relative rights of children and animals. Out of seven communities we chose the largest active group Yazhemat, which has over 1.5 million members. 51% of its subscribers are women and 35% are men, gender is not listed for the remaining 14%. The greatest audience share (90%) comprises teens and young people aged 34 and under, people over the age of 35 make up less than 10% of the audience.

2.3 Characteristics and indicators of the analysed content

The total sample of posts in Yazhemat included 8,637 items in 2017-2019. Each post has an average reach of 328,518 views, which means that every post was seen by around 330 thousand people, on average. We took the number of views to represent the volume of "passive audience reaction" to the content.

The tracked the activity of users using the following indicators:

- Number of "likes". A "like" is taken as an expression of solidarity and support for the sentiments expressed in the post.
- Number of comments. The breadth and depth of discussion as an indication of audience attention, also noting that comments usually encompass a certain conflict.
- Number of reposts. The number of people who share a post shows the online reach of a particular piece of content. This is an alternative form of approval to "likes".

2.4 Selection and analysis of post content

We identified three groups of posts from the total sample for qualitative analysis on the basis of statistical significance of audience reaction. A post (a record on the newsfeed of the online community) is a piece of text, a video or a picture (or a combination thereof), created by community administrators or sourced online. The first group we selected for analysis includes 100 posts that received the most likes. The second group includes 100 posts that provoked the most vigorous discussion (greatest number of comments). The third group comprises 100 records most widely shared by users through reposts.

Each selected post was assigned to a thematic category of analysis (or #hashtag). Hashtagging is one of the search and analysis instruments for social networks. The posts we analysed and tagged often also had hashtags from community administrators. Sometimes, these hashtags coincided and sometimes they did not. The number of hashtags for each post varied, because the post topics sometimes matched several categories. However the aim of our research is not a particular quantitative measurement of attention volume, but a meaningful analysis of the main themes and trends in social media concerning family and childhood in the context of the reproduction of human capital.

3. Results

Since the analysed community is aimed at entertaining users, the main volume of post carries a humorous or ironic subtext. Jokes are mostly about human stupidity (as per the focus of the community – the stupidity of women and mothers in the context of processes related to the reproduction of human capital). This point of view is a common theme in all posts in the community.

3.1 #Lifestyle issues

#Lifestyle in the widest sense of the word and attitudes towards manifestations of otherness was the most "liked", reposted and commented on category. It accounts for around 14% of the most popular posts in terms of likes (from 340,510 to 30,288 likes), 10% of the most discussed by volume of comments and almost half of the most reposted (41%).

The posts talk about choosing a set of values and advocate giving young people the opportunity to make this choice independently. Jokes are mostly about extreme cases of the imposition of traditional values and the enforcement of (perhaps initially well-intended) ideas by older generations.

"Nature's intent" is cited as the main reason why having children is the only right choice in life. As said in one of the posts: "Humans have only one set of teeth for their entire life. Statistically, a human can preserve their teeth in full to the age of 35. The fact that teeth are not renewable is yet more proof that nature intended only one function for humans – having children and caring for them for a rather short period of time. And nothing else". Counterarguments in these discussions are usually parodies of the passage cited above, for example: "A human has only one set of fingers on their left hand. Statistically, they can be fully preserved for life. Fingers are not renewable…". Against this background even reasonable pro-family arguments cannot be taken seriously.

Tragic stories about women's deaths, infant murders and so on are told as consequences of the pro-life (anti-abortion) movement in support of the theory about the "madness of family fanatics". Similar accounts are made by unwanted children: "Wanna know how awesome it is to be an "accidental" baby? … No money, nowhere to live – let's have a kid. We lived in poverty. Shall I tell you who the scapegoat is to this day? … Your mother comes to visit you in your dorm, you're waiting for her, hug her, tell her you miss her and love her, and in response she calls you and ugly pig, a tramp… a drunkard… because your mother was told that "abortion is a sin", just have the kid and everything will be just fine. In the end no-one helped her and my father, and they are having a go to this day. But hey – at least no abortion".

Any resistance against "pro-family fanaticism" is presented as a demonstration of reasonableness. This results in arguments like this one: "I would be able to raise my children well because I am reasonable and apt. But because I am reasonable and apt, I don't want to have children" (supported by 32,073 likes).

The rally against the imposition of family values is closely linked to attitudes towards the LGBT community. Russia has a low level of tolerance towards sexual minorities. However against an aggressive background of

imposition of a family and child-focused lifestyle, the analysed community displays if not open support for the LGBT community, then at least the absence of outright condemnation.

Attitudes to appearance fall into same category of solidarity with different forms of "otherness". This includes biases against tattoos, bold hair colours and unusual looks: "- Wow, three tattoos… did you know that's for life? – Wow, three kids… did you know that's for life?", as well as attitudes to non-mainstream hobbies (online games, music, films).

Thus the content of the analysed community on lifestyle issues indirectly reflects generational conflicts, juxtaposes traditional pro-family beliefs against an individualistic lifestyle, which denounces the value of the reproduction of human capital and successful parenting as a core life value.

3.2 #Upbringing issues

The second most popular category that draws a vigorous reaction from users is the topic of #Upbringing. As opposed to the previous category, here we see support for positive examples of reasonable parent actions. This category is not among the most widely socially shared, but was second in terms of discussion, accounting for 26% of the most commented on posts and 14% of those most "liked" by readers. The following text provides a good illustration of this category: "I was on a bus and opposite me sat two mothers with children. The entire way the kids were screaming and carrying on, even threw their toys at me a few times. The mothers were too consumed in their gossiping. Today I was on the metro and a mother with five kids sat across from me. She was able to manage all of them! She paid attention to each one, read them stories and chatted to them. And the kids were totally calm and reasonable. Other passengers were admiring them just like. A very telling comparison" (this post was viewed 531 thousand times, received 30,799 likes and 188 comments).

This category of posts includes the juxtaposing of "reasonable" and irresponsible, exaggerated parenting. The posts often convey the image of a loving, unconditionally supportive, sometimes unusual friend-parent. This is one of the few topics presented in a positive light, which distinguishes the Yazhemat community from other more radical "child-hating" communities, which resolutely argue for the total absence of children.

3.3 #Animal rights

The next issue which rouses a strong reaction from the audience is the treatment of #animals. This topic accounted for 13% of the most "liked" posts, 16% of the most comment-rich posts and 24% of those most prolifically shared. Discussion chiefly focused on animal cruelty at the hands of children, impunity for young animal abusers and social hysteria about the threat emanating from stray animals.

The topic of young animal abusers gives rise to the rhetoric of "humans being worse than animals". In particular, children and their mothers being much worse than animals: "So think about this – who actually needs a muzzle? A nice dog or a mental mother?" (comment supported by 1929 people), "Animals are more important than humans" (supported by 1958 people), "she is downright scum" (about a mother who poisoned stray dogs) (comment backed by 2228 people).

Such posts often include photos and videos of animal cruelty at the hands of children. As a result we see the following sentiments: "Children are biological waste, which should be disposed of" (comment supported by 434 people).

An analysis of the discussion of this topic shows that young people draw parallels between attitudes to children and attitudes to animals, and between children and animals in general. The upside is that prevailing convictions about the responsible treatment of animals may become a "bridge" for changing attitudes towards children.

3.4 Human #cruelty

Animal cruelty is related to #cruelty in relation to people. Posts in this category are less frequent (6% among most liked, 5% of most reposted). Their content either concerns parental cruelty towards children (physical and emotional abuse) or children's cruelty towards their peers (victimization of classmates and teachers, unpunished bad deeds and so on).

Given the described cases of cruelty towards other people or animals, support is expressed for situations of #vindication (this topic is evident in audience support through likes – 13%, but not as evident in the top-100 rating of comments and reposts – 5%). This goes for cases where a mother (or child) disturb public order or the rights of other people, expecting impunity of account of their social status ("I am a mother!" or "He is a child!"), but receive pushback. An example of such a story may be the cowardice of young hooligans when their misdeeds are made public or they receive punishment. Or stories about a seeming wrongdoing receiving social approval: "My son is a ninth grader. This year, for the first time in 9 years, I was summoned for a meeting with the principal. She screeched at me for ages about "my imbecilic son" dumping a bowl of soup on her daughter. I couldn't even begin to imagine that my child is capable of such a thing. I sat him down at home for a frank conversation. He admitted to doing it, but wouldn't say why. Turns out the principal's daughter spat into the food of a girl from a poor family to see whether she would eat the food anyway or go hungry. My son couldn't bear this and threw soup on this idiot. And put a little extra sauce on top. Everyone in the canteen gave him a standing ovation and he treated the other girl to lunch. I have never been so proud of my boy" (the post was seen by 1.3 million people, liked by 32,251 people, shared by 362 people and commented on 473 times).

3.5 Rights of mothers and children

This is a complex and highly debatable issue for the subscribers of Yazhemat. #Childrens_rights feature in 18% of top reposts and 5% of the top likes and comments; #mothers_rights come up in 15% of top reposts, 9% of top likes and 4% in top comments. Children's rights are chiefly viewed through a legal prism – for instance, the parameters of personal accountability for young sadists; the boundaries of self-defence for an adult attacked by youths; protection against the growing popularity of "paedophilia blackmail". Mothers rights are mostly seen as a code of moral rights: is the status of a mother reason for social and economic privileges; is it an excuse for non-professional and unreasonable behaviour; is society and the state "in debt" to mothers for the reproduction of human capital or is a child the personal choice and responsibility of every woman; and if "the state is indebted", where are the boundaries for this debt in legal and economic terms, and also as regards social relationships, and so on.

3.6 Mothers' behaviour

It is quite clear today that a child is a serious economic burden for a family. Parents (especially mothers) try to seek out compensation for this burden through various means: begging online and offering to sell their own children (!). One of the most resonant pieces of news in terms of likes (around 70 thousand) is a notice about the sale of a child (with the caveat "not for body parts") in a buy-and-sell community. Unfortunately, this post was not a one-off – there were other notices from pregnant women and fathers. In some cases the mother's characteristics were expressly highlighted ("healthy", "young" and so on).

The issue of greed is also connected to stories about alimony that mothers demand from fathers – young people tend to see that this is often unfair. Communities similar to Yazhemat hold women chiefly responsible for a large number of divorces. This is explained by #womens_promiscuity, citing stories about paternity testing. Posts about women's promiscuity are in the top 100 of the most popular records (7% of top 100 likes and 5% of top 100 comments). Ideas of compulsory DNA paternity testing at birth are widely supported. Curiously, social network communities focused on family topics sometimes poll users about the introduction of mass DNA paternity testing. Women are most commonly opposed to the idea. Clearly, this social problem does exist and requires further sociological review.

4. Discussions

Our research directly shows that content, which adversely affects normal processes of the reproduction of human capital, is widely spread and well supported across Russian social networks. Face-to-face communication between older and younger generations on this topic is giving way to virtual exchanges with strangers, with dumbed-down language, emojis instead of emotions and questionable grammar and punctuation norms. Moreover, social media obscures young people through digital avatars, stripping them of the skills required to self-present and effectively communicate in the real world. All of this in turn leads to the depletion of individual intellectual capital in today's young people, who spend a lot of time on social media at the cost of multi-faceted development (indeed, this development is often limited to social media).

Naturally, one must not lose sight of the fact that the community Yazhemat, which we analysed, serves a particular segment. It is not radically opposed to having children in general (like child-free and child-hate groups) and does not have a clear pro-LGBT or feminist/chauvinist stance. Yet it also does not promote the pro-natal position of parenting communities. Groups similar to Yazhemat are mostly focused on entertainment as a means of colliding ideas sourced from more radical movements. This is why they portray a composite image of parenthood, without extreme ideologies, but still demonstrating certain richness.

Young members of Yazhemat respond most vigorously to striking and stereotypical cases of "I am a mother after all" behaviour. In our view, the overarching theme of each post is a lack of mental prowess in women in general and mothers in particular, which breeds intolerance, obscurantism, attempts to get-rich-quick, aggression and grotesque self-assurance.

On the other hand, the authors believes that mothers' self-assurance and expectations of society are attempts to compensate the risks of parenting and receive at least some help while asserting traditional family values. However this provokes the opposite reaction. Traditional pro-natal slogans about the sanctity of children/motherhood/family are turned into pejorative tags "he's just a baby"/ "I'm a mother" / "abortion is a sin" and so on. In Russian, they are deliberately misspelt to underscore the stupidity and narrow-mindedness of those, who use them. As such, people who promote a pro-natal position in social networks are automatically stigmatised as closed-minded, fanatical and poorly educated. Given the spread of individualistic culture in Russia in the transformation of family life, we believe this social conflict will only flourish, adding further complications to issues of the reproduction of human capital.

A constructive aspect of communities like Yazhemat is the presence of a live forum to talk about painful issues of parenting given a wider societal context, namely how to find a balance between respecting and supporting mothers, while safeguarding against abuse of a mother's status (or the sanctity of childhood). The content created in this group clearly shows the risks and flipsides of creating a cult of motherhood and childhood, and also of crude propaganda of a family lifestyle (particularly in contrast to limited opportunities for its actualisation). We believe the risks for today's society in Russia are as follows:

- stifling discussions about genuine problems to do with parenting (for example, psychological problems in parent-child relationships, socio-economic risks for families who have children, juvenile justice);

- encroachments on the reproductive freedoms of citizens;

- stigmatization of otherness, growing social tensions between different socio-demographic groups based on differing values (LGBT/heterosexuals, pro-child/child-free, men/women, young people/older people and so on).

5. Conclusions

We note that one of the limitations of our research was the imprecise nature of the method of hashtagging, because each post can be assigned to multiple categories at once. As such, the category classification we provide is relative, and only reflects general trends in how the topic of family and children plays out in social media.

A detailed analysis of the discussion of issues related to the reproduction of human capital across the largest social network enabled us to shed light on trends currently relevant for young people in Russia. We are certain that state management in demographic policy is not just possible, but highly desirable. The research results we obtained allows us to gain an insider's understanding of the situation, and develop and promote content, which could be of interest for a particular segment of the population.

On the whole, today's digital social media field is a unique analytical instrument, which can take social sciences to a new level. On the one hand, issues and conflicts most pertinent in today's society are naturally reflected there in a true-to-life way. On the other hand, social media is a tool that can influence entire social groups. The nature of this instrument is such that it is maximally decentralized and available to all internet users. Never before has an instrument of societal management been equal parts democratized and unpredictable.

Our research has shown that the use of social media as an instrument of analysis enables us to better understand social processes in real time. Thanks to this we can take considered managerial decisions in all areas, including such private aspects of life as the reproduction of human capital.

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Human Capital in Non-Financial Reports of Selected Polish Listed Companies

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Abstract: The study is to verify whether the introduction of the obligation imposed on Polish companies to report extended non-financial information since 2017, in accordance with the Accounting Act, affected the quality of information about human capital management in public interest entities. The provisions introduced in Poland oblige the entity to include the description of policies applied in relation to social, labor and environmental issues, respect for human rights and anti-corruption in the non-financial report or to provide the explanation if the entity does not apply the policy in the specific area. The issue of obligatory non-financial reporting in Poland is a new one. This article demonstrates how the Warsaw Stock Exchange listed companies approached the obligation to disclose information. The Accounting Act imposes the obligation to compile non-financial information in the form of a statement or a separate report on non-financial information at the level of the entity or/and the group. In the article, it has been analyzed which of these two forms the companies choose to disclose information concerning social, labor and environmental issues, respect for human rights and anti-corruption. Consequently, the annual/integrated reports of 5 listed energy industry companies for years 2017 and 2018 have been analyzed and compared to the CSR (*corporate social responsibility*) reports previously produced by these entities. The results indicate that the introduction of non-financial reporting has impact on the scope of disclosures. In the assumptions, a better reporting model is associated with a better management model and vice versa, since the objective of integrated reporting is to present information about how the entity creates value in a short, medium and long term. The basis of this concept is integrated thinking, understood as operations of people responsible for enterprise management. The results presented in this study confirm the significance of the provisions of corporate reporting in which companies announce information about how they manage natural, environmental, social, human and intellectual capital. The results may be crucial for management executives who are considering the introduction of integrated reporting. It has been verified whether the obligation to announce extended non-financial information by enterprises affected the quality of information concerning human capital management in public interest entities since this is important for the development of these enterprises.

Keywords: human capital, non-financial reporting, CSR reports, Polish Accounting Act

1. Introduction

Globalization and the related transformations lead to changes in the factors affecting the success in the long-term strategy of enterprise development and cause that enterprises operating in the contemporary world are to face specific tasks. One of them is to apply management methods taking into account the role and significance of human capital. Only in the 1960s, the human being was perceived as the structural element of the company's value. Nowadays, intangible resources are more and more often the basis for activities of contemporary enterprises. The source of two-thirds of the welfare of nations is human capital and social capital. Statistical surveys have proved that human capital predominantly contributes to achieving success by enterprises and its poor management is the reason for failure (Monitoring Environmental Progress 1995).

The way to understand if the specific listed company is an attractive investment objective is to analyze its financial results and compare them to other companies operating in the same industry, in similar macroeconomic circumstances. The foundation for the financial analysis and valuation of companies are financial results and operational data, on the basis of which analysts and investors build financial forecasts which eventually allow them to take directional investment decisions (=> buy => sell). Easy and fast access of investors to financial data in each efficiently managed company is the priority of the investor relations team, which results in the need for the introduction of integrated reporting, which is not only an extended approach to information presented in the company's annual report but, most of all, a strategic approach to business, overcoming information barriers within the organization and the abandonment of the traditional approach to the analysis of the company's operations. In the article, it has been analyzed whether the introduction of the obligation to announce extended non-financial information by enterprises affected the quality of information about human capital management, which is important for the development and management in public interest entities. In the

strategies of numerous investment funds in the mature markets of Western Europe and in the United States an increasingly important role is played by the criteria of assessment of investment risk concerning the issues of CSR (*corporate social responsibility*), ESG (*environmental, social and governance*) or RBC (*responsible business conduct*). Among investors in mature capital markets, there is a prevailing view that the assessment and valuation of particular categories of business risks, associated with the activity of companies which transparently communicate non-financial data (in the field of ESG), is easier and more precise and this causes that companies are a safer potential investment objective.

2. The role of human capital in the economic development

An interest in the role of skills and abilities of the human being in generating welfare, according to the study by (Kiker 1966), dates back to the 15th century. In those days, William Petty made an attempt to value the resource of human capital using accumulated remuneration of labor at the level of the national economy. However, it was only in the 1960s that the research into human capital was undertaken and its results were published in the works by (Mincer 1958), (Schultz 1961), (Becker 1964). It is also worth mentioning the research by F. Machlupa into transformations in the economies of highly developed countries, which resulted in the concept of "knowledge-based economy", for the first time discussed in the publication by (Machlup 1962). This concept was, however, popularized only in the 1990s by P. Drucker (1992). In knowledge-based economy, the key to success is obviously human capital (Czajkowski 2012). In the contemporary economy, defined as KBE (knowledge based economy), the potential of human capital is becoming increasingly important. The issues concerning the role and significance of the human factor for the development of the economy are reflected on the grounds of economic theory (Kuada 2015; Neeliah and Seetanah 2016) as well as they are the subject to numerous debates on the grounds of management science. (Welfe 2007, Skrzypek 2009, Walczak 2009, Piech 2009, Panek 2007).

The role of human capital (*HC*) in the process of the development of knowledge-based economy is difficult to overestimate. Its management is becoming a major challenge to managers. Therefore, it is so important to create conditions for the development and constant improvement of the competence of employees. The attitudes and organizational behavior adopted by them significantly determine the development of the company's competitiveness. The most important competences expected from people employed in contemporary organizations, operating in the conditions where a constant phenomenon is changes, include (Walczak 2009):

- sharing the acquired knowledge with others,
- efficient communication,
- team work,
- ability to learn quickly,
- awareness of the need for permanent development,
- orientation to results and effects.

The development of the competences presented may affect effective management of the human capital potential development. In economic practice, there is complementary cooperation of economic sectors based on traditional technologies and new branches of the contemporary economy based on innovation, information technology, knowledge and intellectual capital. Therefore, it becomes very important to skillfully integrate the traditional industry and the development of new sectors of the economy so that they are parallelly developed. It is significant for the economic sectors, where the competitive advantage of enterprises is based on knowledge and modern technologies, to develop, however, this cannot mean that the existence of other sectors of the traditional economy will come to an end. It should be remembered that the basis for the rapid development of the entire economy is the diffusion of knowledge through human capital between various sectors. It is human capital that is the asset which is multiplied and does not lose its value. The high rank of human capital in contemporary organizations is evidenced by the fact that expenditures on the development of intangible assets are higher than investments in technology (Piotrowski 2006). The new theory of economic growth recognizes knowledge and human capital as the most important endogenous factors forming the structure of production and social development. The capital of knowledge is embodied in the human mind and is inextricably linked to the human being. Humans are the carrier and driving force for the creation and distribution of knowledge. In the process of creation, transfer and use of knowledge in practice, the most important role is played by human capital. The concept of human capital in economic terms is associated with the place of the human being in the economic reality. The man is the creator, recipient of production, organizer of economic life, creator of reality

and consumer. In their essence, the human being is not only the resource allowing for an increase in economic capital but also they constitute the value themselves (Marce 1996). The basic characteristics of knowledge-based economy include:

- growing importance of intangible resources,
- replacing basic production factors (labor and capital) with knowledge resources,
- growing importance of the service sector,
- changes in the characteristics of employment,
- changes in the ways of enterprise management (intangible resource management).

The operation in the conditions of knowledge-based economy requires a new approach of enterprises to management. It should be remembered that changes are the necessity one ought to adopt to but it is also essential to manage them steadily, paying attention to business processes.

Enterprises operating in knowledge-based economy more and more often search for methods of effective holistic enterprise management. A high quality of management is provided by integrated management which takes into account the success of the company as a whole, on the basis of its individual parts. The integrated management system mostly includes environment, safety and quality.

3. Integrated reporting

An essential element of changes in management is the change in the way of thinking about the organization and about communicating with stakeholders. Studies show that the main factor which significantly makes it difficult for investors and other stakeholders to make decisions based on reports is their volume and complexity, which makes it difficult to find useful information. Investors are no longer interested in the past financial information but require increased transparency and disclosures related to the overall business model of the company (Noodt, Grede 2013, Śnieżek 2009).

One of the challenges posed to enterprises by the contemporary market environment is the expectation of greater transparency in terms of reporting. Moreover, taking into account legislative, social and environmental changes, there is the need to increase the disclosure of data, not only financial but also non-financial. As indicated by numerous examples, the latter are becoming increasingly valuable both for organizations themselves, from the point of view of management functions, and for external stakeholders, with investors ahead. Despite the fact that the annual financial statement is still considered as a basic tool of communication between the company and stakeholders, providing significant, useful and reliable information, a trend is noticeable towards a more comprehensive approach in reporting, which nowadays can take the form of integrated reporting. At present, the operation of the enterprise in the market is considered in categories of sustainable development, i.e. the development balancing the area of financial results and social and environmental issues as well as corporate governance.

From this point of view, it is assumed that sustainable development of enterprises requires the comprehensive holistic approach, not limited solely to maximization of profits for owners (Matuszak 2016). This integrated thinking, underlying integrated reporting, allows for a better understanding of the relationships between separate organizational units in the company and eliminating artificial barriers between them. Effective communication based on the above may also help investors and other stakeholders notice, in a broader perspective, and thus better understand not only the past and present results of the activity of the entity but also its plans and prospects. These are definitely valid arguments in favor of adopting the integrated reporting model regardless of legal requirements. Studies show, however, that integrated reporting is often actually mostly PR. Integrated reporting is not always perceived as a part of the management process. Non-financial issues disclosed in reports should be strategically important for the organization. The results of sustainable development must be clearly defined and linked to specific performance indicators. Management of the control and accounting systems must be planed and implemented (McNally, Cerbone and Maroun 2017). Moreover, studies have indicated that current reports of enterprises present mainly general threats and not the ones which are characteristic of the reporting entities. They very often provide only positive information whereas negative information is omitted and also retrospective information is presented more often rather than prospective. However, it has been found that reports, integrated due to the fact that they are compiled in accordance with International Reporting Standard (*IRS*), are significantly and positively associated with reporting sustainable

development by Global Reporting Initiative (*GRI*) (Kılıç and Kuzey 2018). Unfortunately, the reporting standards given in International Reporting Standard are not enough and it is also essential to change the approach and the way of thinking about information disclosure. This was confirmed by the research by (Higgins, Stubbs, Tweedie, McCallum 2019), in which the authors claimed that organizations use integrated reports contextually, instrumentally and fragmentarily.

To deliver reports which are variable and useful for numerous recipients, integrated thinking is needed, without which a collection of individual reports is being dealt with. One of the core skills is also clear open communication. Annual reports should present information about the company in a manner understandable to every reader regardless of their preparation and who they are. The report can be read both by experts in the specific industry and an accidental individual investor with vague awareness of the stock exchange problems or of the specific economic sector. Investors are mostly interested in the company's future and it is the context for past data. Therefore, an annual report should include everything which serves the construction and verification of forecasts. The model should describe the vision of what the company wants to be in the future, the record of what it is currently doing and to what extent the events and achievements of the analyzed period contribute to the accomplishment of its strategic goal.

The assumptions concerning integrated reporting are completely reasonable and significantly expand the image of the company's operations, thus strengthening the implementation of the concept of *true and fair view presentation*. However, for the further development of integrated reporting, the key issue will be to improve the quality of information, by means of which this form of reporting will receive legitimacy from a wide range of users.

4. The obligation of non-financial reporting in Poland

According to the requirements of the Polish Accounting Act, the obligation of non-financial reporting is imposed on entities being public interest entities[1], exceeding certain value thresholds and those which are simultaneously parent entities of capital groups exceeding certain value thresholds. The provisions introduced under the Accounting Act constitute the implementation of the Directive 2014/95/UE on non-financial reporting. The Accounting Act obliges the entity to include the description of policies applied in relation to social, labor and environmental issues, respect for human rights and anti-corruption in the non-financial report (Art. 49b, section 2, item 3 of the Accounting Act) or to provide the explanation if the entity does not apply the policy in the specific area (Art. 49b, section 5 of the Accounting Act). It should be pinpointed that the Directive 2014/95/UE did not impose the obligation of possessing the policy by the entity in the specific area but only the obligation of its disclosure if the entity does apply it in one of the aforementioned areas.

The vast majority of public interest entities covered by non-financial reporting in Poland are listed companies. Statistical data indicate that the statutory obligation under Art. 49b of the Accounting Act related to 96 issuers in 2018 (i.e. they were obliged to issue the non-financial statement/report of the company) 90 of which (as the parent entity of the capital group) were simultaneously covered by the obligation under Art. 55, section 2b of the Accounting Act (i.e. they were obliged to produce the non-financial statement/report of the group). The number of parent companies obliged to report exclusively at the level of the capital group amounted to 62. Summing up, the obligation of non-financial reporting at the level of the entity was imposed on a total of 96 issuers, and 152 issuers (i.e. 90 + 62) were covered by this duty at the level of the capital group. In fact, this number is slightly smaller since some of the issuers chose the possibility of presenting the combined non-financial statement/report of the entity and the group.

5. The analysis of non-financial reports of selected Polish energy industry companies in terms of information on labor issues

One may observe an increased interest in the publication of non-financial reports in Poland over the last 10 years. The first and only non-financial report in the given year was published in 2005. In subsequent years the number of reports increased until 2015 when the number of non-financial reports issued by companies amounted to 55. 41 organizations published their reports in 2016. Most organizations report every year but some choose a two-year cycle, hence the fluctuations in reporting observed since 2014. Most non-financial

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[1] Public interest entities are issuers, banks, insurance companies and additionally, in the case of Poland: investment funds, pension funds, entities wishing to apply or applying for admission to trading on a regulated markets of EAE, issuers of securities admitted to trading in the alternative trading system, national payment institutions, electronic money institutions.

reports, since as many as 40, were published by the fuel industry companies in 2016. Banks, with 38 reports, occupied the second position. The third place was taken by the food industry (37 reports). The energy industry companies are also willing to publish their CSR (corporate social responsibility) reports (29 reports) as well as the companies of the related raw material industry (10 reports). Although non-financial reporting was voluntary until 2016, the reporting entities more and more often prepare reports according to international standards. Over the last five years, prior to the obligation of non-financial reporting, i.e. in the years 2012-2016, as much as 78% of all the reports were compiled according to the standard of Global Reporting Initiative**.** Throughout this period 67% of reports were prepared following this standard, which places Poland above the global average. According to the data by GRI, 60% of the reporting entities all over the world use their standard (http://www.csrinfo.org/10-raportowania-niefinansowego-polsce/).

In the study, the non-financial reports of five energy industry companies listed on the Warsaw Stock Exchange (*WSE*) were subjected to the analysis. Four of them are the companies included in RESPECT Index of WSE[2]. The companies chosen for the research have been publishing their non-financial report in the form of CSR reports at least for 5 years.

The conducted comparative analysis of the reports of selected companies operating in the energy industry indicated that individual report parts are created with different levels of detail. The most detailed were the parts concerning achievements and strategies. The information about the business model and prospective data in many cases were, on the other hand, presented with no relation to other parts of the report, e.g. risks, financial data or capital. The lack of connection causes that it is difficult to consider such a document as the integrated report: a set of single reports each of which refers to a different area of information does not meet the requirements of integrated reporting.

On the other hand, as far as the quality of information in the area of labor issues is concerned, in the course of the analysis, it was verified whether the report included indicators or measures of performance/ implementation of the specific policy in the specific problem area and whether, for the included indicators or measures of performance/ implementation of the specific policy in the specific problem area, in addition to the indicator type, also its value/ values for the discussed period were specified. Moreover, it was checked whether measures/ indicators were presented e.g. broken down by segments or geographical areas either before or after a company's takeover (in the case of the group's reports). It should be pinpointed that, in the case of capital groups operating in different parts of the world, the presentation of indicators/ measures broken down by the geographical areas of operation would be particularly useful in terms of information for the users of non-financial information.

In the analyzed reports, in the labor area, there were reported the measures and indicators related to: employment and staff turnover, diversity by gender, employment of the disabled, trained persons (e.g. within the framework of improving professional qualifications), amount of OSH training. Unfortunately, they lacked indicators concerning e.g. minimum wage in the entity (G4-EC5), equal pay for men and women (G4-LA13) despite the fact that, according to the standards of GRI-G4, this indicator should be given. There was also no information about the research into the level of staff satisfaction, information about minimum notice periods and complaints concerning employment mechanisms. There was also no information in the area of the protection of human rights. A lot of information (e.g. child labor or rights of indigenous people) may not apply to the analyzed companies, however, it is not known whether this information, as uncomfortable for the company, is consciously ignored.

In the total non-financial statement of ENEA SA and Grupa Kapitałowa ENEA S.A., in the description of the results of the labor policy, the information about generation gap management in the workplace by the group was given along with the examples of numerous initiatives in this area (e.g. cooperation with schools). Also, in the report by Grupa Tauron, the initiatives implemented under the Diversity Policy were listed, among others, the project "Research into the generation gap", patronage classes, implementation of the project co-financed by the EU in terms of dual education.

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[2] The RESPECT Index project is aimed at the identification of companies managed in a responsible and sustainable manner, but also it strongly emphasizes the investment attractiveness of companies, among others, characterized by the quality of reporting, the level of investor relations or information governance. RESPECT Index, as a result of the verification of the degree of satisfaction of the adopted criteria, every time includes exclusively the listed companies operating according to the highest management standards in terms of corporate governance, information governance as well as in the areas of environmental, social and labor issues.

In the course of the analysis, it was verified whether, when describing the policy in social, labor areas, respect for human rights and anti-corruption, the entity indicated the objectives of the specific policy for the reported year and the nearest years and the operations by means of which it was going to achieve them. Moreover, it was checked if the indicated objectives were actually an individual strategy of the entity (and not only the statement that the entity e.g. was going to respect human rights). In the case of some reports, on the basis of the description of the results in the specific area, it was not possible to establish to what extent the given indicators were the result of any operations within the policy of the entity/ group. Moreover, in addition to the publication of the results of policies for the reported year, a good practice would also be to relate to the previous year (if the policy was in force) and, at least in terms of some issues, to provide average sector indicators/ measures for comparison. It would be a useful piece of information, e.g. in the case of the energy industry entities.

Another issue, which was omitted in the reports, is associated with social challenges of the labor market. Entrepreneurs do not fully perceive the essence of the protection of human rights in terms of the conducted business operations. This area is often linked to labor rights. It is necessary to make enterprises aware that these are different areas. An increasing share of foreigners in the Polish labor market is one of the challenges which require employers to adopt a new approach to diversity management. Also, the area of broadly understood innovation towards Industry 4.0, digitization and robotization should be more clearly recognized in the description of labor issues or protection of human rights.

6. Conclusions

Listed companies publishing information from business reports, among others on their websites, already for a few years, have disclosed non-financial information within the framework of Activity Reports which Art. 49 of the Accounting Act entirely refers to as well as the National Accounting Standard No. 9. However, only a small proportion of listed companies published non-financial information in terms of issues required by law since 2016, i.e. environmental, social and labor issues along with the indication of risks associated with these issues. A significant proportion of companies, when disclosing non-financial information, used the standards developed by Global Reporting Initiative in the form of the study "Reporting principles and indicators of GRI G4".

As indicated by the conducted analysis, the introduction of the obligation of non-financial reporting in the case of the analyzed companies has little impact on the extent of disclosures since these enterprise have prepared and published CSR reports for years. The implementation of the requirement of announcing extended non-financial information by enterprises undoubtedly affected the quality of information concerning human capital management in public interest entities which disclosed information in some areas for the first time since a better model of reporting is associated with a better model of management and vice versa.

Two years after the introduction of the obligation of non-financial reporting, one may claim that the authors of the Polish reports which are based on international standards present a good quality. It should be remembered that reports are a source of valuable information for investors and auditors. They allow for looking at the company in a longer perspective as opposed to financial reports. In the case of non-financial reports, a good solution would be to provide Polish enterprises with a lot of freedom in terms of the preparation of reports. However, it is necessary to spread among enterprises the need for changes towards sustainable development as well as make them aware of social challenges of the labor market. Entrepreneurs do not fully perceive the essence of the protection of human rights in terms of the business activities conducted by them. This area is often related to labor rights. It is essential to make entrepreneurs aware that these are different areas. An increased share of foreigners in the Polish labor market is one of the challenges which require employers to adopt a new approach to diversity management. A separate area, which will have significant impact on labor and social issues, is broadly understood innovation towards Industry 4.0, digitization and robotization.

When creating business reports, it should be remembered, though, that to make them useful for investors they should be transparent, concise and reliably and honestly prepared. The reports, consisting of hundreds of pages, become difficult to interpret and compare. It would be advisable to conduct the research among analysts and investors into which information disclosed in reports is the most useful to them and which is completely useless.

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PhD Research Papers

Digital Business Strategies: An Approach to Managing Digital Innovation

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Abstract: The aim of this research is to investigate the direct effect of digital business strategies on managing digital innovation, which has two dimensions: business processes and market offerings. Due to the novelty of digital innovation, there are a limited number of advanced literature and practical research publications on the digital business strategy capabilities that are required to manage digital innovation. This research attempts to fill the gap in the literature. Four hypotheses were developed based on previous research on digital innovation and digital business strategies; linear regression analysis was used to test the links between digital business strategies and digital innovation. Using a structured survey questionnaire, the data were collected from small and medium-sized enterprises (SMEs) operating in the service and manufacturing industries in Finland. Among the total number of responses, 280 valid responses were received from the respondents, all of whom held managerial positions. The results of the study showed that managerial capabilities as a determinant of realising digital business strategies had a significant direct impact on the business process dimension of digital innovation; however, no direct effect of managerial capabilities on market offerings was found. The study also revealed that operational capabilities as other determinants of digital business strategies had a direct positive significant effect on both market offerings and business processes, called digital innovation. The effect of digital business strategies on business processes was stronger in manufacturing companies than in service companies; however, the effect of digital business strategies on market offerings was stronger in service companies than in manufacturing companies. In addition to theoretical implications, this research provides guidance for managers of SMEs on how to use digital business strategies to manage digital innovation. Moreover, the findings will support managers to search for opportunities to provide new digital products and services while identifying which capabilities enable firms to realise digital business strategies.

Keywords: digital business strategies, digital innovation, market offerings, business processes, managerial capabilities, operational capabilities

1. Introduction

Digital technologies enhance business operations through better connectivity, easy access to information and integrated functions, all of which can lead to innovation with the potential to trigger digital innovation (Gürdür et al. 2019). Digital innovation has radically transformed the structure of products, services and business processes from physical to digital, resulting in novel value creation and competitive advantages for firms (Fichman et al. 2014, Nambisan et al. 2017, Nylén & Holmström 2015). With the high demand for digital innovation, digital business strategies have attracted major attention from innovation and strategic management researchers and practitioners (Mithas et al. 2013). In order to manage digital innovation, there is a need for practices, processes and principles that underline effective digital innovation (Nambisan et al. 2017).

Because of the unique characteristics and key role that digital technologies play in digital innovation, it is challenging to handle and foresee digital innovation (Henfridsson et al. 2014, Yoo et al. 2012). Further, the successful management of digital innovation is more heavily involved with strategies, culture and developed digital skills than it is with technical issues (El Sawy et al. 2016, Kane et al. 2015). Therefore, the fast-paced and far-reaching nature of this phenomenon has caused companies to search for capabilities with which to realise effective digital strategies, thus managing digital innovation (El Sawy et al. 2016, O'Reilly & Tushman 2008, Nylén & Holmström 2015).

Due to the novelty of digital innovation, there is a limited number of advanced literature and practical research publications on the capabilities that are required in digital business strategies to manage digital innovation (Nambisan et al. 2017, Matthyssens 2019). The present study sheds light on the links between the required capabilities to realise digital business strategies for managing digital innovation, which consists of both market offerings and business process. Four hypotheses were developed based on previous research on digital innovation and digital business strategies in the digitally enabled context; linear regression analysis was used to test the links between digital business strategies and digital innovation. Using a structured survey questionnaire, the data were collected from small and medium-sized enterprises (SMEs) operating in the service and

manufacturing industries in Finland. Among the total number of responses, 280 valid responses were received from the respondents, all of whom held managerial positions.

Based on the European Commission report, Finland has been ranked as the global leader in the digitalization of businesses. As a result, companies need an appropriate digital business strategy to be able to develop their businesses. For instance, Wärtsilä is the global leader in marine and energy markets in Finland, which considers digitalization as a fundamental driver among every aspect of the company from strategy to operations. Another example is Verohallinto, the Finnish Tax Administration (FTA), who has approximately two decades of history in digitalization. Digital services and operations in FTA not only enhance the efficiency of the operations by reducing the need for manual work but also increase the total tax revenues by introducing user-friendly, easy-access and intuitive digital interfaces for people to fill in their tax returns. (Microsoft 2017)

The remainder of the article is structured as follows. First, the current understanding of digital innovation and digital business strategies is explained and the hypotheses are developed. Then, the methodology section is presented, followed by analysis and results. Finally, the conclusion section summarises the theoretical and empirical implications, describes the study limitations and proposes avenues for future research.

2. Theoretical framework and hypotheses

2.1 Digital innovation and digital business strategies

Digital innovation is explained as generating both business processes and market offerings; digital technology plays a key role in this (Nambisan et al. 2017). The initial generation of digital technologies in the 1990s enabled companies to effectively simplify operations inside companies whilst creating opportunities for business process innovation (Lee & Berente 2012). In recent years, digital technologies expanded beyond their original boundaries, interpenetrating companies' products and services offerings (Yoo et al. 2012). Thus, digital innovation in this study consists of two dominant dimensions. The first dimension is related to innovative business processes, including automating production processes and real-time activities (Fichman et al. 2014), whilst the second dimension is related to innovative market offerings such as digital products and services (Nambisan et al. 2017, Nylén & Holmström 2015).

Digital business strategies are defined as enlarging digitalisation in business strategies (El Sawy et al. 2016), which involves both managerial routines (El Sawy et al. 2016) and operational activities (Chen et al. 2014). Managers need to have knowledge and information about digital tools and strategies to appropriately understand and react to threats and opportunities (Xue 2014). Furthermore, it is necessary for managers to have a clear vision about companies' digital strategies and the ability to think differently about digitality to encourage and support their employees toward digital transformations and practical ability (El Sawy et al. 2016, Parida et al. 2015, Sia et al. 2016). Thus, in this study, managerial capabilities are used as one of the determinants for realising digital business strategies, which consist of managers' mind-sets, skill-sets and adaptability toward digitality. In addition to managerial capabilities, companies need operational capabilities to change their business processes and operations so they align with digitalisation (Xue 2014, Chuang & Lin 2015). Therefore, this study defines both managerial and operational capabilities as crucial to realising digital business strategies.

2.2 Impact of digital business strategies on managing digital innovation

Companies' digital transformation influences products, processes, organisational routines and management concepts; they need digital business strategies to realise this transformation (Matt et al. 2015). When companies introduce a disruptive technology like digital innovation, they must make changes at all levels of the organisation, and managers should have the capability to convince and support employees to transform their way of thinking (both managers and employees) to help adopt disruptive technologies. In other words, all employees and managers should cultivate these beliefs and locate disruptive technologies as the core of their firms (Lucas & Goh 2009). Matthyssens (2019) named limited support from managers toward new products and the lack of open mind-sets, knowledge and skill-sets as barriers to business process innovation. Moreover, when managers can express their strategies and expand their mind-sets, they are more primed for innovation as well as transitions in both internal and external processes (Levy & Powell 2000). Companies that can adopt novel outlooks and align internal processes with novel innovations operate better than those that cannot (Cragg et al. 2002). Thus, in addition to technical transformation, managerial mind-set transformation refers to game-changing innovations that create competitive advantages for companies (Ringberg et al. 2018). Digitally well-

informed talent at firms grant the capability to transform digital technologies into digital innovation (Chan et al. 2019).

H1: Managerial capabilities have a positive direct impact on business processes.

In terms of digital offerings, digital innovation needs digital business strategies in order to recognise novel sources for creating value, including generativity, heterogeneity, digital product platforms and meaning-making capabilities. Thus, there is a need for strategic frameworks to help uncover related capabilities in managing digital products (Yoo et al. 2010). According to Nylén and Holmström (2015), the initial step toward managing digital innovation in terms of digital offerings is giving managers specific knowledge about digital technologies. Furthermore, advancing managers' capabilities in terms of their digital mind-sets and skill-sets could help firms to manage their operations in the digital era (El Sawy et al. 2016), which includes effectively managing digital services and digital business processes.

H2: Managerial capabilities have a positive direct impact on market offerings.

Technology is just one part of the complicated response to digital innovation (Vial 2019). Strategies (Bharadwaj et al. 2013, Matt et al. 2015), structural organisational transitions (Selander and Jarvenpaa 2016), processes (Carlo et al. 2012) and culture (Karimi & Walter 2015) are other elements that are necessary to achieve the capability to create value and manage digital innovation. Furthermore, digital innovation comes from new actors, structures, practices, mind-sets and beliefs that transform, replace or threaten the current operations inside organisations. Therefore, successfully managing digital innovation results in novel organisational infrastructure, building blocks and operational capabilities (Hinings et al. 2018). Firms' adoption of digitalisation is a focal point of digital business process research, which mainly concentrates on the way functions are processed, decided and conducted in digitality (Fichman et al. 2014). Moreover, digital innovation transforms how firms conduct business, and it can be considered as a driving force behind business development. Thus, companies need to manage their digital innovation such that they achieve competitive advantages (Chae 2019).

H3: Operational capabilities have a positive direct impact on business processes.

Since embedded digital technologies in products and services will continue to increase, disentangling business processes from their IT infrastructures is challenging. In turn, digital business strategies call for coordination within companies among processes, products and services, thereby generating more complicated and dynamic environments for innovation (Pagani 2013, Bharadwaj et al. 2013). Furthermore, disruptive digital innovation makes changes in both business operations and business models (Weill & Woerner 2015). Thus, in confronting digital innovation, considerable breakthroughs and developments in capabilities are critical (Chan et al. 2019, Fichman & Melville 2014). Here, failure to develop appropriate capabilities to realise strategies might lead to lost market opportunities. Kane et al. (2015) describe having the capability to detect the influence of novel digital technologies on business processes or models beforehand and to take the necessary risks as 'critical capabilities' – something that organisations need in order to manage digital innovation. This might explain the reason behind the notion that digital technology can bring success for one company and failure for other companies in similar situations (Chan et al. 2019). In this regard, it is relevant to refer to Kodak with digital photography technology and Nokia with smartphone technology, both of which failed to respond quickly to the emergence of disruptive digital innovation (Chan et al. 2019, Lucas & Goh 2009). Li et al. (2009) found a positive relationship between expanding digitalisation in business processes and new product development. Consequently, functional and process strategies fall under the umbrella of digital business strategies, with operational capabilities serving as connective tissue (Bharadwaj et al. 2013).

H4: Operational capabilities have a positive direct impact on market offerings.

3. Methodology

3.1 Sample and data collection

The cross-sectional data were gathered using a survey questionnaire administered to manufacturing and service SMEs in Finland. Among the total number of SMEs in Finland (20,000), 6,816 SMEs were randomly selected. The contact information was not valid for 986 of the companies, and the survey was administered to 5,830 SMEs – 280 people in managerial positions responded. The demographic information of the respondents is contained in Table 1.

Table 1: Demographic information of the respondents (N = 280)

Characteristics	Number of enterprises	Percentage (%)
Revenue (million €)		
Small (2–10)	195	69.64
Medium (10–50)	85	30.36
Sector		
Service	160	57.14
Manufacturing	118	42.15
No response	2	0.71
Age (years since established)		
Less than 29	138	49.29
More than 30	142	50.71

3.2 Pre-tests

Approaches suggested by Armstrong and Overton (1977) and Podsakoff et al. (2003) were used to confirm that the responses represented the entire population and to reduce both common method bias and non-response bias. As Podsakoff et al. (2003) explained, common method bias can be reduced if the items are located such that the respondents cannot discover the relationship between the dependent and independent variables, if the survey is conducted anonymously and if the results of the Harman's one-factor test load have loadings that are less than 0.50 of the total variance in more than one factor. All of the aforementioned were applied here, confirming that common method bias was not an issue in this study. In terms of non-response bias, according to Armstrong and Overton's (1977) work, the lack of bias can be confirmed if there is uniformity between early and late respondents. The present study confirmed that there was no significant difference between the early and late respondents; thus, there was no non-response bias.

3.3 Measurements

All the constructs were based on the digital business strategies and digital innovation literature review. Digital business strategies consist of both managerial and operational capabilities, defined here as the independent variables. Both variables were measured based on three items (see Table 2). Digital innovation served as the dependent variable, comprising both business processes and market offerings. Business processes and market offerings were measured with two items (see Table 2). The SMEs' managers answered all the items for both the dependent and independent variables using a seven-point Likert-type scale varying from 'strongly disagree' (1) to 'strongly agree' (7). Three control variables, including firm size, firm type and firm age, were defined in order to control for and reduce the effects of confounding variables. Firm size was controlled by the amount of revenue, firm type was controlled by whether the firms were service providers or manufacturers and firm age was controlled by the years since the firm was established.

4. Analysis and results

Before testing the hypotheses, the reliability and convergent and discriminant validity of the constructs were tested with confirmatory factor analysis (CFA) and different indices including Cronbach's α, composite reliability (CR), average variance extracted (AVE) and maximum shared variance (MVE) (see Table 2). All the loadings were greater than 0.4, which confirms the items' reliability (Carmines & Zeller 1979). Cronbach's α was used to check the reliability of the measurement constructs. Boyer and Pagell (2000) recommended a cut-off value of 0.6 for Cronbach's α, and Nunnally (1967) argued that smaller Cronbach's α for new scales with small numbers of items should be allowed. As shown in Table 2, Cronbach's α for all the constructs except market offerings (0.591) were greater than 0.6. The CR values for all the constructs were greater than the recommended value of 0.6 (Fornell & Larcker 1981), confirming the constructs' reliability. In terms of convergent validity, the AVE values for all the constructs except for market offerings (AVE = 0.452) were greater than 0.5, confirming the convergent validity of the constructs.

Table 2: Standardised parameter maximum likelihood estimates

Latent variable	Observed variable	Loadings	Cronbach's α	AVE	CR
Managerial	Our managers are familiar with digital tools.	0.834	0.831	0.643	0.873
(El Sawy et al. 2016, Parida et al.	Our managers have a clear vision about using digitality in the future.	0.875			

Latent variable	Observed variable	Loadings	Cronbach's α	AVE	CR
2015, Sia et al. 2016, Xue 2014)	Our managers support digitality in our company.	0.684			
Operational	Digitality enhances our business.	0.791	0.862	0.697	0.842
(Chuang & Lin	Digitality is a natural part of our business.	0.907			
2015, El Sawy et al. 2016, Sia et al. 2016, Xue 2014)	Utilising digitality in internal processes has become an important part of our business.	0.801			
Business process	Real-time activities	0.827	0.638	0.507	0.666
	Automating production processes	0.575			
Market offerings	Digital services	0.554	0.591	0.452	0.616
	Digital products	0.773			

According to Fornell and Larcker (1981), in order to confirm the discriminant validity of the constructs, the value of the squared root of AVE should be greater than the value of the correlation between the constructs. The results shown in Table 3 suggest the convergent validity of the constructs. Thus, based on the information provided in Table 2 and Table 3, the reliability and validity of the constructs are supported.

Table 3: Correlations

	Managerial	Operational	Business processes	Market offerings
Managerial	0.802[a]			
Operational	0.683***	0.835[a]		
Business processes	0.441***	0.466***	0.712[a]	
Market offerings	0.340***	0.472***	0.148	0.672[a]

[a] Square root of AVE, Sign. *** ≤ 0.001

Regression analysis using structural equation modelling was used to test the hypotheses. Table 4 demonstrates the standardised parameter maximum likelihood estimates, including predictors, outcomes, hypotheses, parameter estimates, standard error (SE) of regression weight estimate, critical ratios (CR) and P-values. As shown in Table 4, the positive direct impact of managerial capabilities on business processes was also found (CR = 2.341, P = 0.019). Thus, H1 was supported. In contrast, the positive direct impact of managerial capabilities on market offerings was not found (CR = 0.276, P = 0.782), which means that H2 was not supported. Moreover, the operational capabilities had significant direct effects on both business processes (CR = 3.282, P = 0.001) and market offerings (CR = 3.282, P = 0.001), which supports both H3 and H4. The effects of firm size and firm age could not be found, but the effects of firm type on both business processes and market offerings were negatively and positively significant, respectively. This implies that the effects of digital business strategies on business processes is stronger in manufacturing companies than in service companies; however, the effects of digital business strategies on market offerings is stronger in service companies than in manufacturing companies.

Table 4: Standardised parameter maximum likelihood estimates

Predictor	Outcomes	Hypothesis	Parameter estimate	SE	CR	P-value
Managerial	Business processes	H1	.212	.091	2.341	*
Managerial	Market offerings	H2	.34	.121	0.276	.782
Operational	Business processes	H3	.282	.086	3.282	**
Operational	Market offerings	H4	.398	.121	3.282	**
Firm size	Business processes	−	.000	.000	−.229	.819
Firm size	Market offerings	−	.000	.000	.658	.511
Firm type	Business processes	−	−.342	.137	−2.488	*
Firm type	Market offerings	−	.938	.205	4.577	***
Firm age	Business processes	−	.004	.003	1.652	.099
Firm age	Market offerings	−	.000	.004	.123	.902

Sign. *** ≤ 0.001, ** 0.001 < P ≤ 0.01, * 0.01 < P ≤ 0.05

5. Conclusion

The goal of this study was to empirically examine the effect of digital business strategies on digital innovation. Moreover, it investigated the capabilities needed to realise digital business strategies. The results of the study showed that managerial capabilities as a determinant of realising digital business strategies had a significant direct impact on the business process dimension of digital innovation; however, the direct effect of managerial

capabilities on market offerings was not found. Furthermore, operational capabilities as other determinants to realise digital business strategies had a direct positive significant effect on both market offerings and business processes, called digital innovation. The effect of digital business strategies on business processes was stronger in manufacturing companies than in service companies; however, the effect of digital business strategies on market offerings was stronger in service companies than in manufacturing companies.

5.1 Theoretical implications

The findings of this study have three main theoretical implications. First, the literature review on innovation management reveals that in order to manage digital innovation, firms must employ digital business strategies, which requires managerial and operational capabilities. The reason behind this might be the influences of companies' digital transformation on products, processes, organisational routines and management concepts, all of which highlight the important role that digital business strategies play in management practices (Matt et al. 2015). Furthermore, the results of this study are consistent with the findings of previous researchers who report that technology is just one part of the complicated puzzle needed to respond to digital innovation (Vial 2019). Strategies (Bharadwaj et al. 2013, Matt et al. 2015), structural organisational transitions (Selander & Jarvenpaa 2016), processes (Carlo et al. 2012) and culture (Karimi & Walter 2015) are other facets that are necessary to create value and manage digital innovation.

Second, the study indicates that managerial capabilities as a determinant for realising digital business strategies have a significant direct effect on business processes, but the effect of managerial capabilities on market offerings is not significant. Referring to H1, this is in line with previous research that identifies managers' mind-sets, knowledge and skill-sets in relation to novel technologies as being important elements in managing business process innovation (Chan et al. 2019, Levy & Powell 2000, Matthyssens 2019, Ringberg et al. 2018). However, referring to H2, the results of this study did not find a significant effect of managerial capabilities on digital offerings. This might be related to the structure of digital products and services, which expands beyond the boundaries of a single firm (Yoo et al. 2012) and needs more than just managers' capabilities to use digital tools and support digitality. This is in contrast with Nylén and Holmström's (2015) findings – they identified managers' capability to use digital technologies as a first step in managing digital offerings.

Third, the results of the study show that operational capabilities as other determinants to realise digital business strategies have a significant direct effect on digital innovation. Referring to H3 and H4, this is in line with previous research, which describes the necessity of new organisational structures, building blocks and operational capabilities (Hinings et al. 2018). Previous research also highlights firms' need to adapt to digitalisation in their business processes, decision-making and internal functions (Fichman et al. 2014) to successfully manage digital innovation. With the emergence of digital innovation, transformations in terms of digitality in actors, structures, practices, mind-sets and beliefs must occur to effectively manage digital innovation.

5.2 Managerial implications

This study provides guidance for managers of SMEs on how to use digital business strategies to manage digital innovation. The findings will support managers to search for opportunities to provide new digital products and services while identifying which capabilities enable firms to realise digital business strategies. Firms can effectively manage digital innovation by enhancing operational capabilities to realise digital business strategies.

5.3 Limitations and further research

Because this study outlines opportunities for further research, the study limitations must be mentioned. Since the study was conducted on a single country and a single group of respondents, the generalisability of the results is called into question; there is also an issue of researcher bias. It would be worthwhile to validate this study by conducting a similar study in several different countries involving multiple groups of respondents. The cross-sectional nature of the data also causes limitations in studying issues that develop and change over time; therefore, similar research should be conducted with longitudinal data.

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Towards Desirable Skill-Set Acquisition by Construction Management Students: A Systematic Review

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Abstract: The technological insurgency which characterizes the era of Knowledge-based economy coupled with the emergence of Industry 4.0 makes the future of the construction industry very promising especially for the prepared. As the World Bank report on Knowledge Economy rightly puts it, an educated and skilled population is a requisite for creating, sharing and using knowledge, a pillar of any Knowledge-based economy. This goes without saying that students in construction management education are expected to exhibit desirable skills set and competencies needed for this knowledge-based economy so as not to be rendered redundant. However, an apropos systematic assessment of both current and past studies on the subject matter needful for future endeavor is lacking. This paper puts forward a comprehensive systematic review of the desirable skill sets of future construction management students from carefully chosen articles in well-known construction management journals to address this gap. A total of 86 different skills were identified from over 40 publications and analysis made in terms of annual trends of publications, contribution of authors, countries and research institute/universities and the thematic categorization of the identified variables. Notable among the categorized desirable skill sets were digital literacy, technical skills, managerial skills and professional skills. This research expunges the current literature of desirable skill sets of construction management students for the knowledge-based economy. Furthermore, this study provides deepened understanding and valuable information to industry practitioners, policy makers as well as Institutions of Higher Learning in the inculcation of these desirable skill sets in their curricula. This study propels further research especially among construction management education researchers.

1. Introduction

During the 18th, 19th and 20th centuries, most parts of the world were transformed through the industrial revolution. However, this era of globalization (21st century) is characterized by information (Knowledge) as the transformative power of revolution (Brynjolfsson and Mcafee, 2016). According to Ojanperä, Graham and Zook (2019), the availability of a number of information and communication technologies (ICTs) as well as movement towards human capital, technology and service-oriented economy triggered this information revolution. Consequently, the construction industry finds itself in this knowledge-based economy.

There has always been the need for educated and highly skilled professionals as a result of the construction industry's peculiar characteristics such as complexity of projects, dynamism, 3D computer aided modelling, sophisticated usage of construction equipment requiring advanced IT skills, competition among stakeholders, management techniques and higher expectations from clients (Leifer, O'Connor, and Rice, 2001; Christodoulou, 2004; Atalah and Muchemedzi, 2006). New challenges prevalent in the construction industry daily, places emphasis on construction professionals to acquire variety of skills and competencies to handle these challenges (Styhre and Josephson, 2006). Many scholarly works classify skill sets in the form of technical and non-technical skills, managerial, leadership, professional attributes, communication, digital literacy, decision making, innovative, life-long learning, legal and contractual skills, etc. deemed vital to the overall progress of the construction industry (Leifer, O'Connor, and Rice, 2001; Thomas and Mengel, 2008; Zaharim et al., 2010; Zhao et al., 2015).

According to Ling and Ho (2012), for the construction industry to survive in the long-term, there is the need to attract fresh talent. This raises a lot of concerns as to whether decline in these desirable skill set will have an impact on long-term sustainability of the more complex construction domain. As Singapore wraps her head with much concern in these fresh talents meeting the future industrial needs (Lim and Alim, 1995), the United Kingdom also experiences decrease in the number of graduates looking for and accepting offers in construction-related jobs (Dainty and Edwards, 2003). This phenomenon according to Atalah and Muchemedzi (2006) could

better be explained by Higher Education Institution's slow pace in adjusting to the dynamism of the 21st century's construction industry.

The technological insurgency which characterizes this era of Knowledge-based economy makes the future of the construction industry very promising especially for the prepared. The onus therefore lies on construction management students who are expected to show forth these desirable skills set in order to thrive in this knowledge-based economy without been rendered redundant. However, an apropos systematic assessment of both current and past studies on the subject matter needful for future endeavour is lacking. This paper puts forward a comprehensive systematic review of the desirable skill sets of future construction management students to address this gap. The following objectives were put forward:

- To identify the annual trends of publication of desirable skill sets of Construction Management (CM) students from 1990 to 2018;

- To identify contributions of the authors and countries in their exploration of desirable skill set for CM students from 1990 to 2018; and

- To identify, categorize and discuss skill sets under different constructs.

This study begins with the need for desirable skill set acquisition of CM students, presents the methodology adopted, and selects academic journals based on which appropriate publications are chosen. Findings are presented and discussed. The review ends with the conclusion.

1.1 The need for desirable skill set acquisition among construction management students

According to Becker et al. (2011), the responsibilities of construction education programs can be classified into two to include imparting the desirable skills and competencies for successful construction professionals and re-modification of academic curricula to reflect future construction industrial needs. To prepare future construction professionals, Tatum (1987) in his study posited that Universities especially those in the USA initiated Construction Management programs that saw the enhancement of skill development evolve. A number of Universities across the world took advantage of the evolvement and initiated postgraduate degree programs in Construction Management to accommodate the forecasted increasing demand in subsequent years. Christodoulou (2004) supported this assertion and added that engineering institutions must educate Architectural, Engineering and Construction (AEC) professionals of tomorrow through the fusion of process automation concepts and information technologies in addition to the usual traditional educational curricula.

Although considerable efforts to develop desirable skill set by Higher education institutions have been forthcoming in the construction domain, other prominent international organizations such as the World Bank, the United Nations, the Organization for Economic Co-operation and Development, the World Economic Forum among others have played active roles either directly or indirectly in promoting the development of desirable skills.

The findings of the study by Ling and Ho (2012) confirmed that the construction industry gives room for practitioners to solve problems without strict adherence to the well-known routine solutions from traditional engineering analysis. This therefore calls for the need of skill variety as a construction professional attribute.

A number of researchers (Christodoulou, 2004; Domal and Trevelyan, 2009; Zhao, et al., 2015) have attributed the unpreparedness of graduates from construction management backgrounds to rigid academic content of curricula, limited electives offered as an extension of the compulsory courses, curricula lacking multidisciplinary collaboration with other relevant skill areas and the gap surrounding the expectations of the construction industry as against the perceptions of Higher Education Institutions (academia). These attributes have a negative toll on the performance of the industry and hence demands prompt pragmatic solutions.

Christodoulou (2004) in his provision of a solution is of the view that the new generation of students (Gen Z) in this era should be able to blend traditional engineering knowledge with that of information technology, financial concepts and management as a result of the dynamic needs of the construction industry today to tackle the challenges of the profession thrown at them. Naveed et al., (2017) argues that there need to be constant revamping and enhancing of the construction management programs (curricula) which is inevitable if this dynamic industry's needs are to be met. Hence the onus falls on the stakeholders such as the government

bodies, students, employers and institutions of higher learning (academia) to contribute their quota in ensuring this transition becomes fruitful

2. Research methodology

Methodological analysis of manuscripts published in refereed journals is of much importance to the research community as other researchers and practitioners alike gain much insight of the trends happening in that field (Tsai and Wen, 2005). Ke et al. (2009) and Yu and Yang (2016) have conducted scholarly works on Knowledge Management in the construction industry in three-phase literature reviews. The three-phase review of Yu and Yang (2016), however failed to include the assessment of contributions in terms of countries, universities and authors. This study eliminates this failure by the inclusion of these parameters. With the aim of doing away with subjectivity as seen in the conduct of literature reviews, certain procedures in the selection and investigation of publications based on keywords search were employed (Creswell, 2014). Skill set research papers published in construction management journals from 1990-2018 using the three-phase search process were systematically analysed upon retrieval to gain insights into the trends as well as identify key and potential areas for further research as presented in Figure 1.
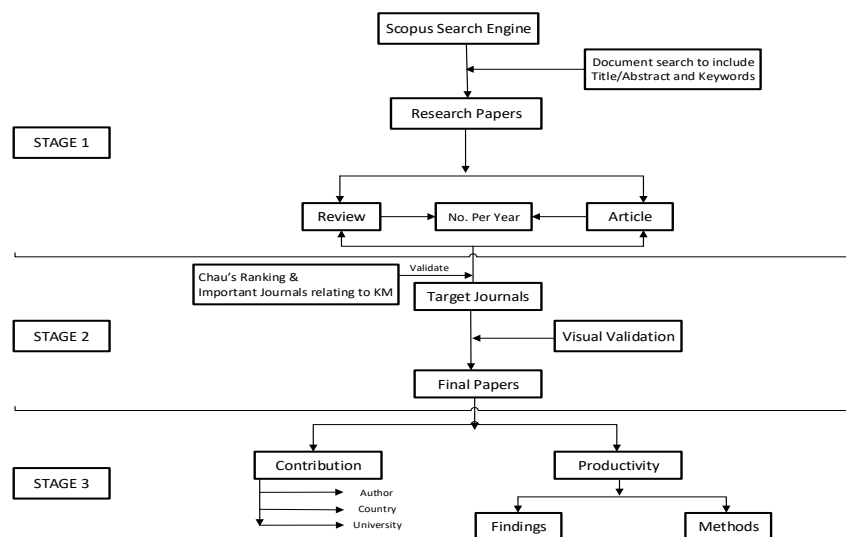
Source: Adapted from Yi and Wang (2013)

Figure 1: Research framework for the study

The three-phase literature review were put forward to include:

- identifying the academic journals;

- critical selection of relevant papers to ensure valid representations; and

- assessment of contributions in terms of authors, and countries and discussion

2.1 Identification of academic journals

Scopus search engine was used to obtain a list of publications in academic journals on skill-set development related papers in construction education. The adoption of Scopus was based on three reasons: 1) a source of archive for most research publications in the engineering, management, accounting and business fields (Hong and Chan, 2014), 2) Scopus performs better as compared to other search engines, such as Web of Science, Google Scholar and PubMed with regards to coverage and accuracy (Falagas et al., 2008) and, 3) similar review of literature studies in construction management using Scopus (Darko and Chan, 2016).

A number of researchers employ Keywords in searching for relevant papers for review studies (Darko et al., 2018; Owusu et al., 2017). Similarly, this study adopts this approach in identifying and selecting construction journals and papers. Not a single study can capture all the complexities related to the selection of Skill-set keywords, the challenge in getting a workable number of desirable skill-set papers was therefore minimized by the assumption that common keywords in Construction management Skill acquisition research included "Desirable skill set", "desirable competencies", "construction management students", "higher education" and "construction management education". These keywords were therefore used in this study.

A pilot desktop search under the "article title/abstract/keywords" field of Scopus was conducted choosing document type as "article or review". The search was limited to "construction management" or "construction engineering and management" and "construction education" domain. Additionally, the search was further restricted to subject areas of "social sciences", "engineering", "business", "computer science", "arts", "environmental sciences", "economics", "decision sciences" and "multi-disciplinary". The full code for searching is as follows:

TITLE-ABS-KEY ("desirable skills" OR "desirable competencies" OR "construction management students" OR "construction management education") AND DOCTYPE (ar OR re) AND PUBYEAR > 1989 AND PUBYEAR < 2019 AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "DECI") OR LIMIT-TO (SUBJAREA , "ECON")). (Initial Search results: 120 documents (searched on June 10, 2019)

Many attempts were made to rid the search of non-construction journals, however, a number of them showed up. As a general rule to ensure that only papers limited to Skill-set coverage in construction journals are used, journals, such as "Nurse Education Today" and "Sociology of Health and Illness", which are not deemed as construction journals, were taken out. Therefore, either one of the following criteria was employed in selecting the construction journals:

- The showing of at least two papers of the journal (via the search).
- The ranking of the journals within the top ten of Chau (1997) ranking of Construction Management journals based on its wide acceptance in the construction field.
- Other essential journals of international organizations that were not captured in the desktop search.

The criteria above resulted in a total of twenty-five identified journals. These journals (i.e. Journal of Management in Engineering (JME), Journal of Construction Engineering and Management (JCEM), Automation in Construction (AIC), and Engineering, Construction and Architectural Management (ECAM)) could also be found within the top 10 ranked construction management journals by Chau (1997). This clearly indicates that the targeted journals for this study are of good quality and reliable. The outcome of the search indicated that the top targeted journals identified were also ranked as top-tier construction journals that have published the most Skill Development related papers as can be seen in Table 1.

2.2 Critical selection of relevant papers

The selected journals resulted in 96 documents out of the initial search results of 120. The keywords appeared in either the article title, abstract or keyword of these documents and thus satisfies the initial requirement for analysis. There however still existed the possibility of irrelevant documents showing up. Phase two was therefore initiated to include scanning thus reading the abstract of each of the 96 documents in a bid to remove irrelevant articles. Papers that do not actually focus on skill development and construction management education were excluded since the aim was to review articles on KM and construction management education. A total of 41 papers were deem valid owing to this selection criteria. Table 1 summarizes the initial search results.

Table 1: Search results of papers on desirable skill set of construction management students in selected journals

Name of Journal	No of papers retrieved from search engine	No of papers relevant to study
Journal of Professional Issues in Engineering Education and Practice	14	3
International Journal of Construction Education and Research	24	10
Journal of Construction Engineering and Management	4	1
Journal of Management in Engineering	3	1
International Journal of Engineering Education	6	2

Name of Journal	No of papers retrieved from search engine	No of papers relevant to study
Engineering Construction and Architectural Management	3	1
Architectural Engineering and Design Management	4	1
Journal of Construction Education	13	3
Journal of Engineering Science and Technology	3	1
Sustainability (United States)	2	1
Automation in Construction	4	1
Ubiquitous Learning	3	1
European Journal of Engineering Education	5	2
Proceedings of Institution of Civil Engineers: Management, Procurement and Law	2	1
Assessment and Evaluation in Higher Education	3	2
International Journal of Construction Management	3	1
Leadership and Management in Engineering	4	1
Journal of Vocational Education and Training	3	1
Journal of Applied Research in Higher Education	2	1
Research in Post-Compulsory Education	4	1
International Journal of Environmental Technology and Management	2	1
Human Resource Development Quarterly	3	1
Research in Science and Technological Education	2	1
International Journal of Phytoremediation	2	1
Automatica	2	1
Total	120	41

2.3 Assessment of research contributions

Research publications have been deemed by academic institutions and researchers as significant means of imparting industrial practice (Colpaert, 2012). Hence, identifying active contributors is paramount in order to appreciate the mainstream of research in that discipline across different regions.

The research contribution from each researcher, research institute and country were analysed and ranked quantitatively. Howard et al. (1987)'s proposed formula was adopted as there existed a clear differentiation of the contribution of each individual writer in a multi-authored paper. This formula was adopted by Yi and Chan (2014) in their research trend in construction labour productivity, and Osei-Kyei and Chan (2015) in their review of critical success factors for public-private partnership projects. This widespread usage guarantees its reliability and suitability for articles and hence its adoption in this review. The proposed formula is shown below:

Score$= \frac{1.5^{n-i}}{\sum_{i=1}^{n} 1.5^{n-i}}$ where n=number of writers/authors of the paper and

i=order of the specific writer/author

This proportionately divides the credits of authors in a multi-authored paper after applying the formula.

3. Analysis and discussion

3.1 Annual publications on skill development of construction management students from 1990 to 2018

120 papers were given a closer look resulting in 41 publications been identified for further analysis. Presented in Figure 2 below is the annual publications from the final collection of journals chosen from 1990 to 2018. With an increasing trend of one publication in 1991 to 4 and 7 in 2011 and 2016 respectively, the total number of published papers from these selected journals constituted forty-one (41). There was a rapid increase in 2006 with 3 papers published. The peak was witnessed in 2016 with 7 publications indicating the gradual rising of interest in exploring what skill set development has to offer in Construction Management Education.

The period between 2010 and 2018 gave rise to 29 publications. It must be stressed that the increasing trend of research of Skill development in Construction Management Education would linger on as knowledge (acquisition, transfer, storage and usage of soft and hard skill) as a resource is the core theme of any educational scheme especially in this era of globalization and technological advancement.
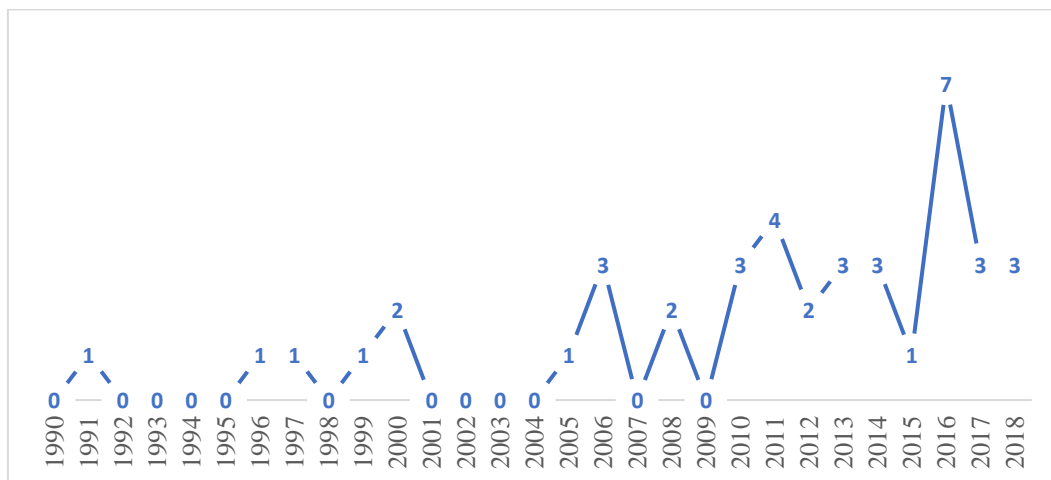
Figure 2: Number of publications per year

3.2 Contribution of countries to skill set development of construction management students

The score matrix was used in the determination of researcher country's contribution towards publication. Each author's score either as a sole-authored or multi-authored publication was put together for each country based on the score matrix and hence produced their contribution. To demonstrate an example, Ahmed, Yaris and Saqib from the US collaborated with Farooqui from Pakistan to publish an article which brings the score for each author to 0.42, 0.28, 0.12 (4th author) and 0.18 (3rd author from Pakistan) respectively. Therefore, in measuring the contribution in terms of author's country of origin, a score of 0.82 (0.42 + 0.28 + 0.12) is awarded to the US while Pakistan receives 0.18. This approach is also applied to single-authored publications. Table 2 presents the contribution by way of countries thus also showing the number of universities/institutions and researchers, identified papers as well as their scores.

Table 2: Geographical scope of selected skill set development papers of CM Students (Top 10)

Countries	Institutions/Universities	Researchers	Papers	Score
USA	*22*	*54*	*19*	*17.12*
Australia	*6*	*11*	*7*	*6.4*
UK	*3*	*5*	*3*	*2.21*
Hong Kong#	*2*	*5*	*2*	*2*
New Zealand	*2*	*3*	*2*	*1.49*

Countries	Institutions/Universities	Researchers	Papers	Score
Mexico	*2*	*8*	*2*	*1.26*
Malaysia	*4*	*5*	*1*	*1*
Taiwan	*2*	*2*	*1*	*1*
Brazil	*1*	*2*	*1*	*1*
Canada	*1*	*3*	*1*	*1*

\# - Hong Kong is a special administrative region of China but is catalogued separately for comparison purpose.

The USA with scores of 17.12 had the highest number of researchers delving into the concept of skill set development in the construction management student context. From Figure 2, 54 researchers from 22 different Universities contributed to 19 publications thus placing emphasis on the relevance they attached to improving the skill of their future professionals. This can also be seen as an appreciative effort in bridging the industry academic skill gap. Countries like Australia, UK and Hong Kong had scores of 6.4, 2.21 and 2 respectively with 7, 3 and 2 publications on the subject matter respectively. These statistics shows the widespread development of the future skill set from two decades ago as more researchers have shown keen interest. A peculiar feature of the data was the significantly low contribution from developing countries which could be due to the infant stage this concept is at their level or perhaps publications made by the developing countries might not have been indexed in Scopus and thus not captured under this study which can be considered a limitation for this study.

3.3 Contribution of universities and research institutes to the research

As shown in Table 3, the top 10 institutions/universities publishing papers on skill sets are presented. Additionally, presented are the number of researchers, countries of origin of the Research Institutions/Universities, and the total papers. Research institutions/universities that have paid most contribution to this research area include but not limited to Colorado State University (USA), RMIT University (Australia), Deakin University (Australia), University of New South Wales (Australia), and East Carolina University (USA) with contribution scores of 3.10, 2.00, 2.00, 1.40, and 1.39 respectively. All these institutions/universities exceeded one-point score in their contribution CM student's skill set development research. Again, pioneering the course of skill development research is the USA where most of their institutions/universities have published the most papers. Almost all the research institutions/universities contributing most to this research were from developed countries hence the need for developing countries to take a cue from these developed nations in coming to speed with this phenomenon.

Table 3: Top 10 research institutions/universities publishing skill set development of CM Students (using the score matrix)

Rank	Institution/University	Country	Researchers	Papers	Score
1	Colorado State University	USA	12	8	3.10
2	RMIT University	Australia	4	2	2.00
3	Deakin University	Australia	2	2	2.00
4	University of New South Wales	Australia	2	2	1.40
5	East Carolina University	USA	4	1	1.39
6	The Hong Kong Polytechnic University	Hong Kong	4	1	1.00
7	University of Alberta	Canada	3	1	1.00
8	University of Florida	USA	3	1	1.00
9	Auburn University	USA	3	1	1.00
10	Central Connecticut State University	USA	3	1	1.00

4. Categorization of desirable skillsets of future CM professionals

Based on the selected publications from construction management journals, seven (7) major categorization of desirable skill sets were identified as shown in Figure 3. They include:

- Technical Skills;

- Digital Literacy Skills;

- Industry and Business Skills;

- Managerial Skills;

- Legal and contractual Skills;

- Professional attributes; and

- Personal attributes

Technical Skills

- Plans interpretation/ Blueprint reading/Understanding construction & shop drawings
- Knowledge of construction operations
- Knowledge of green and sustainable construction/ LEED
- Scheduling
- Knowledge of project closeout and handover procedures
- Estimating
- Cost accounting
- Knowledge of construction materials
- Knowledge of construction equipment
- Economic and financial analysis
- Knowledge of design
- Value engineering/Constructability analysis/ Design Review
- Scope review

Professional Attributes

- Hands-on project experience prior to graduation/ Internship
- Teamwork capabilities
- High regards to values/ Work ethics
- Planning and goal setting
- Long term commitment
- Problem solving/ Analytical skills
- Result orientation
- Critical path thinking
- Decision making skills
- Forecasting
- Ability to follow up
- Risk taking
- Multi-tasking

Managerial Skills

- Health and Safety management
- Quality assurance/ Total Quality Management
- Inspection/ Quality control
- Document control
- Project management/ administration
- Cost control
- Leadership
- Team building
- Site planning and management
- Personnel/ Resource management
- Risk planning, assessment and control
- Productivity management
- Managing labor issues
- Knowledge and information management
- Financial management

Desirable Construction Management Skill Set

Industry and Business Skills

- Knowledge of health and safety regulations
- Knowledge of building codes and regulations
- Knowledge of environment impact assessments
- Marketing with clients/ Developing client relations
- Knowledge of the permitting process
- Construction trade knowledge
- Understanding procedural issues
- Understanding cultural issues
- Understanding complementary fields/disciplines
- Awareness of industry trends
- Appreciation of construction industry supply chain
- Understanding geographical issues
- Construction organization management/Business Management
- Entrepreneurship
- Partnering
- Understanding global Construction Environment
- Understanding lean culture

Personal Attributes

- Listening ability/ Giving attention to details
- Time Management
- Dependability
- Personal adaptability/Flexibility
- Desire to learn
- Assertive attitude
- Promptness in actions
- Comprehension ability
- Ability to learn
- Innovative mindset/ Creativity
- Willingness to travel (when required)
- Ability to speak different languages / Multilingual
- Ability to communicate (Written and Verbal)

Digital Literacy Skills

- General computer proficiency
- Proficiency in construction information technology
- Knowledge of construction data analytics
- Proficiency in BIM technology software
- Knowledge of construction simulation and modelling tools such as Webcyclone
- Knowledge of big data applications in construction
- Knowledge of Augmented/Virtual realitys oftware applications in construction

Legal and Contractual Skills

- Interpreting contract documents
- Knowledge of construction law and legal environment
- Contract administration skills
- Knowledge of bidding procedures
- Dispute avoidance and resolution skills
- Knowledge of project delivery and contracting strategies
- Change management
- Understanding labor laws
- Claims preparation and presentation Skills
- Claims defense skills

Source: Adapted from Yu and Yang (2016)

Figure 3: Desirable construction management skill set

5. Conclusion

Novel challenges prevalent in the construction industry daily, places emphasis on construction professionals to display variety of skills and competencies to handle these challenges. This places much emphasis on the acquisition of desirable skill set needful for successful future construction career. However, little scholarly attention has been given to the need to provide systematic review studies on this variety of skill sets as present in this era. Several studies have been published by researchers reporting various hard and soft skills construction industry practitioners need. This paper reports a review of the existing body of knowledge of desirable skill set of CM students. By reviewing carefully chosen publication in peer-reviewed CM journals from 1990 to 2018 (years inclusive), this study identified a total of 86 different skills as shown in Figure 3 and further categorized them into 7 constructs. Based on annual publication trend on the subject matter, the peak was witnessed in 2016 with 7 publications indicating the gradual rising of interest in exploring what skill set development has to offer Construction Management Education. The period between 2010 and 2018 gave rise to 29 publications. The increasing trend of research on Skill development in Construction Management Education would linger on as knowledge (acquisition, transfer, storage and usage of soft and hard skill) as a resource is the core theme of any educational scheme especially in this era of globalization and technological advancement. In terms of contribution, country wise, the USA had the highest contribution placing emphasis on the relevance they attached to improving the skill of their future professionals which was also seen as an appreciative effort in bridging the industry academic skill gap. Almost all the research institutions/universities contributing most to this research were from developed countries such as USA, Australia, Canada and UK, hence the need for developing countries to take cue from these developed nations in coming to speed with developing the skillset of their students.

This study presented some limitations. Although the number of academic studies relevant to skills development reviewed in this paper could provide a general overview of the future skill requirement of CM students, it is deemed that the number of reviewed publications is relatively small. To this effect, future review should increase the sample size probably by employing different literature search engines. Such a review is needed for future proofing of the findings reported in this paper. This study provides deepened understanding and valuable information to industry practitioners, policy makers as well as Institutions of Higher Learning in the inculcation of these desirable skill sets in their curricula. This study propels further research especially among construction management education researchers.

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Masters Research Paper

Designing a Knowledge Management Framework Based on ISO 39001:2012 Guidance

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Abstract: This paper aims to propose a knowledge management framework for reducing errors in bus transportation management that provides a basis for designing and developing a system based on ISO 39001:2012 (Road Traffic Safety: RTS). To meet standard requirements, RTS is comprised of three parts: driver, vehicle and journey. An initial investigation of the case revealed that there were some human errors and miscalculations of the operations due to the unconnected database platforms which led to inefficient operation of the drivers, lack of experienced route surveyors and unscheduled vehicle maintenance. By integrating scattered data types, a Management Information System (MIS) framework was designed as four major steps. A semi-structured interview and document analysis were used to audit knowledge and identify the scope of the problem domain. Knowledge capture and analysis were performed to depict knowledge model using knowledge engineering method based on the required standard of ISO 39001:2012. Moreover, the design of the requirement framework was created. Later, the software design and MIS were developed. A focus group was then selected to test performances of the system and to measure the satisfaction levels of knowledge workers. Knowledge sharing was done at the final stage to update and transfer the learned knowledge throughout the organization, using the community of practice.

Keywords: ISO 39001:2012, knowledge management, framework, management information system

1. Introduction

Road accident is considered as one of critical social and economic problems of countries around the world. It is caused by the risky behaviour of car users such as drowsiness, fatigue of the driver due to long working hours, substance abuse and alcohol abuse, including natural obstacles and climatic characteristics, physical characteristics of incomplete roads such as road roughness, etc. In addition, there are parts of vehicles that are not up to standard and the speed that exceeds the law. These are all risk factors that cause more accidents and damage to life and property, especially in the accident of public buses because when there is an incident, there is a risk of losing more than other types of vehicles) Pearce and Maunder, 2000(, regardless of the number of injured and the deceased. Therefore, it should focus on the prevention of accidents, death and serious injuries in the long term which can be achieved by using standards about the road safety management system of the International Standard Organization (ISO 39001) that gathers analysis in all aspects of road transport systems which cause collisions.

At present, the International Organization for Standardization (ISO) has announced the use of ISO $39001: 2012$ Road Traffic Safety (RTS) Management System that focuses on preventing road injuries and clearly recognizing the shared responsibility and systematic management throughout the public and private sectors. ISO 39001 conforms to other ISO management standards, including ISO 9001 quality management system and ISO 14001 environmental management system while ISO 39001 provides directions on important security issues and focuses on achieving better results for interim and long-term purposes, aiming at eliminating death, serious injury and the consequences of traffic accidents (Small and Breen, 2017). It applies the requirements according to the guidelines of the general quality management system such as the overview of the management system, management leadership, risk analysis and occurrence opportunities, policy formulation, objectives, road traffic safety management goals; support processes include training, communication and document and data control. The measurement and evaluation process consist of internal audits and management review.

However, the implementation of ISO $39001: 2012$, road traffic safety management applied in planning and operation should have a sustainable operational goal in order to create knowledge and systematic operations. Knowledge Management, therefore, has a role to help improve the quality of people, improve the quality of work and develop the organization to a learning organization. It is the process of identifying, recruiting, organizing, sharing and applying knowledge and monitoring and evaluating if any organization that has

successfully managed knowledge within the organization will make the work more efficient. The knowledge and experience of the various departments, including executives, will not be lost from the organization even though there are changes in the position of work and migration of personnel, therefore, knowledge management will help the work to be continued and the information should be updated to the present, with data integration which requires the development of management information systems (MIS) to support such processes efficiently (Keyes, 2006).

The preparation of MIS in accordance with ISO $39001: 2012$ must specify the process or activity affecting the system of road traffic safety management. It must be linked and integrated in all 3 parts: (1) Driver information - selection of drivers and management methods and motivation of drivers to ensure proper skills and behavior, especially in terms of speed and suitability of the driver, (2) Vehicle information – selecting and using the most suitable vehicle for design and installation to reduce the risk of a car crash on the road and the risk of death and serious injury for vehicle users and other road users including inspection and maintenance to ensure proper cargo handling without requiring overloading and the security of passengers and goods and (3) Route information - safe travel planning to ensure optimal route, speed and working hours / driving and considering other vulnerable road users within the road network, especially in the event of road traffic incidents and emergency preparedness(Small and Breen, 2017), therefore, it is necessary to develop management information systems to increase operational efficiency because the information system allows users to access information quickly and in time, helping to set goals, strategies and operational plans including developing a knowledge base and increasing intellectual capital for the organization in order to be able to continue to grow and fight future uncertainty. Management information systems will follow the requirements of the security management system that must be set up, documented and followed. Processes and supporting documents need to support management tasks. System documentation and reporting related to that system must be sufficient for the purpose of effectively controlling security risks and improving safety outcomes (Small and Breen, 2017).

This paper is organized as follows: The next section will present a literature review about knowledge management, knowledge management system and ISO$39001: 2012$. This section provides a comprehensive summary of knowledge management perspectives and implications for knowledge management including knowledge management processes and presenting this view in detail, identifying the potential role of information technology in various stages of the knowledge management process and the perspective of the organization that wants to apply ISO39001 to be used as a framework for managing knowledge and explaining the details in terms of procedures, population and tools used in the design and development of management information systems according to developed framework. The last section is a summary and presentation about the discussion.

2. Literature review

In this research, the researchers studied the relevant documents and research work which included the content of knowledge management, concepts and theory of knowledge management, knowledge management perspective and the implications for knowledge management including knowledge management processes, the perspective of the organization that wants to apply ISO39001 to be used as a framework for knowledge management and related research. It has the following details.

2.1 Knowledge management

Knowledge management is a system of work in the organization that emphasizes knowledge and believes as somethings that improve the quality of people, improve the quality of work and develop the organization into a learning organization. Knowledge management is a process that can be considered as an organizational management tool in the state of changing positions, work and migration of personnel in the organization where knowledge and experience are not lost from the organization. Executives must be those who have a vision of managing the organization that will encourage personnel in the organization to create and exchange knowledge that everyone can use to work more efficiently and effectively. As Snowden (2006) said, it is the management of existing knowledge in the organization to improve the quality of decision-making in the organization and to create 3 innovations: (1) content management, (2) narrative management and (3) context management.

O 'Dell and Grayson (1998) said that knowledge management is a strategy that will allow people to gain the knowledge they need in a timely manner and help them exchange and apply knowledge to upgrade and improve

the operations of the organization. Knowledge management is not a tool to directly manage knowledge management but is a way to exchange knowledge.

The concept of Senge (1990) on learning organizations that means making people in the organization eager to learn and create knowledge to focus on the link between the method of knowledge management in terms of innovation, product or service that is evident. In this regard, learning is a process of searching for the appropriate knowledge to be used in the organization and continuously developing or creating new knowledge. While knowledge management is a management to exchange effective knowledge, the knowledge management and appropriate tools will help the organization to change the format or method of work to keep up with business changes and will bring good operating results. From looking at the learning organization of Garvin (2000) to understand the relationship between learning organizations and knowledge management by comparing from coins with 2 aspects. Learning organizations are skills in creating, procuring and transferring knowledge as well as changing the behavior of personnel that will affect new knowledge. In the same way, knowledge management is an important issue that results in learning and applying knowledge and converting people's knowledge into organizational knowledge. Being a learning organization requires skills in 5 areas as follows: (1) systematic problem-solving, (2) experimental studies with new approaches, (3) learning from past experiences, (4) learning from other people's best practices and (5) fast and effective knowledge transfer throughout the organization. However, as a learning organization, there must be a measure of the changing behavior of the organization and the results.

2.2 Knowledge management elements in the organization

Honeycut (2007) emphasized on knowledge management and concluded that Knowledge management in the organization must consist of: (1) organization, (2) process and (3) technology. Snowden and Yamazaki (2007) stated that knowledge management requires art rather than scientific principles. There are 4 stages of knowledge management: (1) data, (2) information, (3) knowledge and (4) wisdom. Kujiro (1995) concluded that tacit knowledge must be made by meeting and discussing each other by summarizing the three principles: (1) individual, (2) structure and (3) corporate culture. Drucker (1995) proposed the concept of 7 systematic knowledge management methods: (1) motivation, (2) goals, (3) learning, (4) planning, (5) access to knowledge, (6) action and (7) exchange. American Society for Training and Development: (ASTD, 2007) concluded that the contributing factor to successful knowledge management is of 8 points: (1) leadership, (2) structure, (3) communication, (4) process and technology, (5) reward and recognition, (6) measurement, (7) competency and (8) management. Senge (1990) summarized the importance of knowledge management innovation: (1) learning, (2) creating innovation, (3) dissemination of competencies, (4) being a learning organization and (5) practice community. Davenport and JB Probst (2007) stated that knowledge management consists of 8 aspects: (1) determining and building a team, (2) strategy formulation, (3) conducting a survey of existing knowledge in organizations, (4) selection of pilot projects, (5) project development, (6) technology support, (7) determination of master plan and (8) monitoring and control of projects. Osterhoff (2007) from Xerox Corporation, USA, summarized six key elements of knowledge management: (1) transition and behavior management, (2) communication, (3) process and tools, (4)training and learning, (5) measurement and (6) recognition and reward.

2.3 Knowledge management process

American Society for Training and Development: ASTD (2007) concluded that a knowledge management process consists of 5 steps: (1) define, (2) create, (3) capture, (4) share and (5) use. Kujiro and Yamazaki (1999) stated that knowledge management requires four types of knowledge: (1)tacit knowledge and socialization, (2) externalization, (3) changes from tacit knowledge to be explicit knowledge, combination and (4) changes from explicit knowledge to be tacit knowledge, internalization.

2.4 Related research

Pawlowski and Bick (2012) studied the global knowledge management framework as a guideline for developing knowledge management processes and success factors for decision-makers and practitioners. The results of the research indicated that the framework of the global knowledge management practice is composed of (1) processes, including business processes, knowledge process and external processes, (2) stakeholders, including personnel, organization and society, (3) contexts, including organizational culture, strategies, policies, infrastructure and success factors, (4) knowledge, including knowledge elements, types of knowledge and problems that apply knowledge, (5) tools and facilities, including personnel-related tools such as job rotation,

counseling, team development, planning, career advancement and knowledge management; technology tools such as knowledge management systems and communication systems and (6) achievement, consisting of knowledge, success of knowledge management project, intellectual capital and measurement as a global organization such as strategic partners in the organization, increased communication concentration and world-class capabilities. Factors of success in knowledge management include (1) integration of technology infrastructure, (2) defining knowledge strategies such as users, knowledge, sources of knowledge and process of collecting knowledge, (3) establish a clear knowledge structure, (4) motivation and covenants, (5) supporting corporate culture-sharing and using knowledge, (6) high-level executives support resources with leadership and training, (7) successful determination of assessments to evaluate knowledge management, (8) determine the goals of the knowledge management system, (9) define the process for collecting and using knowledge, (10) being a learning organization and (11) security and prevention of knowledge damage in terms of information.

2.5 Application of ISO *39001: 2012* Road Traffic Safety Management Systems (RTMS)

Small and Breen (2017) Since its establishment in 2005, RTMS has achieved significant success as a voluntary compliance program in road transport in South Africa by improving road safety, legal compliance and operational efficiency. Companies that use RTMS have reported qualitative and quantitative benefits such as reducing the occurrence of problems up to 66%, overloading reduction, accident reduction, speeding and improving fuel consumption by 20% (Nordengen, 2006). Additional benefits include reducing driver turnover due to HIV problem and related problems, improving driver's health to reduce absenteeism, reducing vehicle decay and good vehicle utilization. Increase through reduced driving behavior is in line with driving heavy vehicles and motivating employees (Nordengen et al., 2014); considering the success achieved by certified companies, we expect high levels of RTMS usage in South Africa.

Johansson (2012) Systematic road safety work helps the company to make a profit. This is one of the surveys conducted by the Swedish Road Transport Association (SA) among 141 road transport companies that operate systematically on road traffic safety. Discovery in 2003, the Swedish Association of Road Transport Companies (SA) has produced the Road Traffic Safety Standard (SA-RTS) in accordance with the management principles of the ISO 14001 standard and has been certified by the company. RTS factors are such as legal speed limits, seat belt usage and substance use while driving. Policies, objectives, audits, corrections and safeguards assessment as driving measures are managed according to the well-known principles of the management system under the framework of the SA-RTS standard. While worrying about the company's profit of about 40% in responding to surveys that are good or very good and 72 % indicate that SA-RTS contributes to making the company profitable at the highest or highest level possible from the SA-RTS certification. Närkefrakt Swedish Road Transport Company is probably the first company in the world to be certified in March 28, 2012 according to the international standard RTS (DIS) ISO 39001 drafts.

3. Step for developing a proposed framework
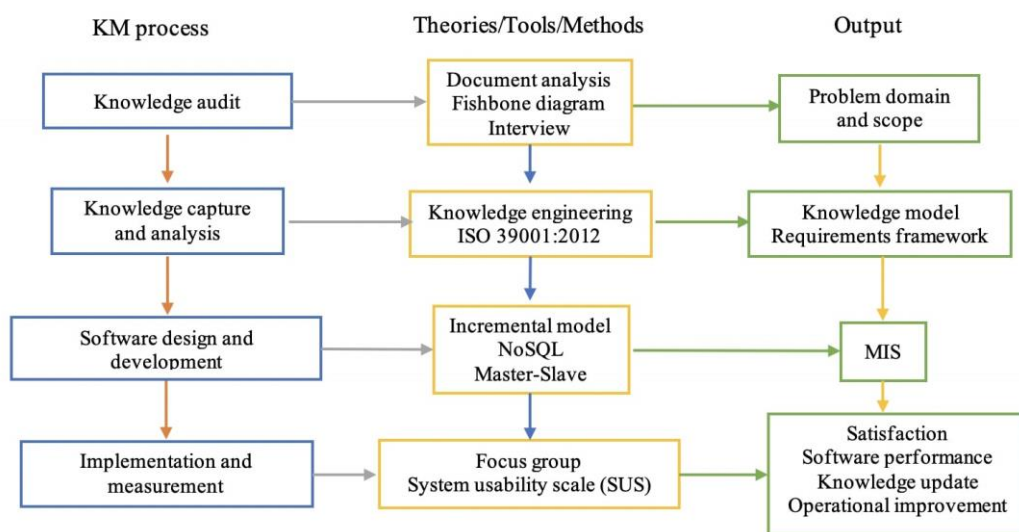
Figure 1: Knowledge management framework based on ISO 39001:2012 guidance

Figure 1 describes the research process by using knowledge management as a framework for research. In this section, the researchers will develop a systematic framework which consists of 4 steps to work:

- 1. Knowledge audit or problem identification: Knowledge audit is a systematic examination and assessment of the organization's knowledge, especially as an analysis of the needs of an organization, assets or knowledge resources, knowledge flow needs, knowledge in the future, gaps of knowledge and behavior of people in sharing and knowledge creation with knowledge audit can reveal the strengths of knowledge, weaknesses, opportunities, threats and risks of the organization)Liebowitz et al, 2000; Hylton, 2002; Schikkard & Toit, 2004; Cheung et al, 2007). Knowledge audit or identify problems will start by interviewing executives in a structured interview format including president and managing director of transport and travel business group who provide information about the organization's problems as specified. Since the nature of knowledge is unique, it is necessary to measure and evaluate knowledge not only in terms of results but also in terms of knowledge of people's perceptions. Everyone in the organization will have his/her own perceptions or perceptions of what knowledge is worth and its value. The existence and characteristics of the knowledge often depend on the person (as opposed to documented or processed knowledge) who decides on how and when to use knowledge using his work experience (Hylton, 2002). By analyzing company documents to determine the questions that get the answers, we need and use it as an open-ended question to allow the discussion persons to express their opinions or more relevant attitudes and written in a fishbone map to see the cause of the problem and impact, then the data were analyzed to evaluate the main problems and scope of research.

- 2. Knowledge capture and analysis by using the knowledge method of engineering under the scope of ISO 39001: 2012 in 3 main topics. Because it is the starting point of following the ISO requirements, the subject of understanding the company's context, leadership and planning to gather information by interviews from executives, ISO39001: 2012 experts for advice on matters are required in the system and in the position of Chief of Staff in 5 departments to inquire information, receive knowledge from experts and people with work experience to acquire the knowledge structure to consist

- *IT department to inquire about the flow of information systems used in data collection.*

- *personnel department to inquire about the process of allocating drivers that there are any rules or conditions that will be used in the analysis.*

- *car maintenance department to inquire about the maintenance process and conditions for removing the vehicle from the system.*

- *route surveying department to study the route that has been collected and how to find the accident information for the past 4 years 2015 - 2018 (routes in the upper north only).*

- *marketing department and sales department to study the process of designing the bus schedules of the company.*

Then, the data obtained were analyzed and synthesized to obtain the Knowledge model structure and the framework of the system requirements by using a structured CommonKADS Knowledge model to help see opportunities and bottlenecks in the way organizations work in terms of development, distribution, application of their knowledge resources and as tools for managing knowledge of the organization as the methods to perform a detailed analysis of knowledge-intensive tasks and processes.

- 3. Software design and development (MIS) by using incremental development approach model that is the model that was evolved from the waterfall model because the waterfall model has a disadvantage that must be completed before proceeding to the next step. If a large software development project takes a lot of time, there is a high risk of the opportunity to go back to start a whole new project. If planning is not good enough, the principle of the incremental model is to divide the work system into various subsystems. The subsystem is called the increment, which is like a mini-project. It will develop the system that is the main task of the system first, then develop each increment in order until the completed work system. By dividing the work into these subsystems, if any impact occurs, it will only send the work in the subsystem and the subsystem will have a repeatable development cycle and have a validation process to ensure that the work meets the requirements. Developing programs using this model will have more progress in the system. In each phase or each increment will get a subset of the software system and the system will be more and more complete until finally complete system. In the development of the system, we have to have a database to use as the main database to store as a database called NoSQL (a term that stands for Not Only SQL). It is Unstructure of SQL database. It is a solution to the problems of a database that has large data and does not

have a clear format, without the need to store data in a single table with the same data all in one table but can store data in many formats and we will use the master-slave to link data. This is a model of communication for hardware devices where one device has a unidirectional control over one or more devices. This is often used in the electronic hardware space where one device acts as the controller whereas the other devices are the ones being controlled. In short, one is the master and the others are slaves to be controlled by the master. The most common example of this is the master/slave configuration of IDE disk drives attached on the same cable where the master is the primary drive and the slave is the secondary drive.

▪ 4. Implementation and evaluation will be in the form of focus group which is an update of knowledge within the organization. In addition, the System Usability Scale (SUS) provides a quick and reliable tool for measuring the usability. It consists of a 10-item questionnaire with five response options for respondents; from Strongly agree to Strongly disagree. Originally created by John Brooke in 1986, it allows you to evaluate a wide variety of products and services, including hardware, software, mobile devices, websites and applications. Interpreting scoring can be complex. The participant's scores for each question are converted to a new number, added together and then multiplied by 2.5 to convert the original scores of 0-40 to 0-100. Though the scores are 0-100, these are not percentages and should be considered only in terms of their percentile ranking. Based on research, a SUS score above 68 would be considered above average and anything under 68 is below average, also evaluates the satisfaction of users of the system, including performance measurement. There are indicators that compare numbers before and after errors that will have management information systems.

4. Conclusion

The framework of knowledge management focuses on the knowledge management system in adopting the ISO 39001: 2012 was guidelines derived from the synthesis of knowledge management theory and ISO. 39001: 2012 used to develop information systems and management by integrating three data links: people, vehicles and routes. It is an important factor causing the risk of accidents in order to make decisions of the management. For the highest requirement of this article is to present the knowledge management framework according to the guidelines of ISO39001: 2012 for the best use of the information that the organization has. Such frameworks are important in gathering scattered knowledge and lack of systematic management through organizing knowledge management roles to work together to share the value of resources which must be systematically stored, which is considered the intellectual capital assets of the organization, using case studies of transportation service providers in the northern region of Thailand. This research will help the company get information that support work and decisions in various areas of the management, including reducing the chance of accidents. In addition, it can also be used as an information system model for road traffic safety management. Evaluation can be done further for measuring the system performance and analyzing the results comparing to the current operations.

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Work in Progress Papers

Adopting a Maturity Model for Communities of Practice in an Engineering Industry

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Abstract: This paper proposes in adopting a model of assessing the level of maturity in communities of practices (CoPs) in organisations. The model is based on theoretical development attained from the analysis of previous CoP frameworks proposed in the existing literature. Using this approach, we adopted nine main elements in   leadership, organisational, technological and performance dimensions in auditing the CoP 'health' in organisations. Systematically understanding the current position and examining practised activities, a maturity stage of a CoP was established. By adopting this model, a holistic, systematic, and comprehensive framework with different maturity stages for navigating CoPs were built, to develop a road map for moving from a potential to a self-sustaining level, examine inconsistent activities to mature, and devise structured action plans aligned to strategic organisational initiatives. This action research project was based on a qualitative case study design that was conducted via observations and participation in the brainstorming sessions, with main units of analysis being CoPs. The objective was achieved by adopting a maturity model of CoPs based on the key dimensions and studying actual experiences in a six (6) year old CoP of engineers in the Public Works Department of Malaysia, integrated with this model. Although the study is exploratory in nature, the evaluation methodology is unique. Based on the results of the study, we can implement this benchmarking tool to investigate the characteristics of a CoP in different settings and 'growth' stages and eventually determine a correlation between community maturity levels and organised performance.

Keywords: communities of practice, CoPs, knowledge management, CoP assessment, CoP maturity model

1. Introduction

Organisations are increasingly examining the potential of virtual communication networks to enable members to share knowledge and engage in ongoing workplace learning and professional development (Bolisani et. al, 2016). An important area within such sharing of knowledge and professional development is the notion of virtual communities of practice, which has gained significant ground in recent years (Othman et. al, 2015), particularly in the corporate world (Basri et. al, 2018). A virtual community of practice (CoP) is a network of individuals who share a domain of interest about which they communicate online. The practitioners share resources (for example experience, problems and solution, tool, methodologies). Such communication results in the improvement of the knowledge of each participant in the community and contributes to the development of the knowledge within the domain. Although much has been written about what CoPs are, how they are formed, how they work and what they are good for, formal research on CoPs and assessing their strengths and weaknesses and exploring strategies to improve the usage of this collaborative networking platform in organisations, has been limited both in the way of finding results and in the research method used (Andrew et. al, 2008).

The main contribution of this paper is the adoption of an assessment model that provides an overview of the 'health' of an organisation's CoP system in the public service, practices and technologies that are adopted to achieve success. The model also helps to identify the potential actions that can be taken to improve the maturity of a CoP within the public sector. The remainder of the paper is structured as follows. First, we will introduce a brief theoretical background (Section ''Theoretical background'') to multiple fields in CoP assessment: the approach involving CoP influencing factors, the knowledge management field and the CoP management model approach. After this, we will explain the methodological procedures used in this paper (Section ''Research method'').

In Section ''Results'', we will present our results in two parts: the proposal of an assessment model and the application of this assessment model to an empirical study in an engineering industry. Finally, we will present the discussion and conclusion to this paper (Section ''Conclusions'').

2. Theoretical background

Several scholars have proposed models and approaches to assess communities (Lesser & Storck, 2001; Verburg & Andriessen, 2006; McDermott, 2002). Very few community-oriented KM maturity models have been proposed (Gongla & Rizzuto, 2001; Lee et al., 2010) and moreover, little is reported on their application and evaluation. The current paper is an attempt to address this gap and to propose a new model for assessing communities, following a 'growing process' approach, looking at how maturity stages can improve the communities (Weber (2015); Kaplan (2017)). This study contained a guideline of nine assessment factors (key elements) for achieving better results from a CoP: Leadership, Member Participation, Governance, Enabling Technology, Knowledge Sharing Behaviour, Professional Development, Organisation Support, Value Proposition, and Communication. A community audit then utilises a matrix of these elements to measure the maturity of the CoPs in an organisation and geared CoP Managers to rate their KM practices from 1 (low) to 5 (high).

The idea was for community managers to be able to evaluate their knowledge-sharing experiences and diagnose factors that should be paid attention to, when managing a CoP. By adopting a CoP maturity model, a holistic, systematic, and comprehensive framework with different maturity stages for navigating CoPs were built to develop a road map for moving from a potential to a self-sustaining level, examine inconsistent activities to mature, and devise structured action plans aligned to strategic organisational initiatives. Managers will need to analyse their existing gaps, and develop strategies to mitigate gaps in order to reach to the next maturity level.

3. Research method

This case study adapted to a combination of existing growing models in assessing the level of maturity in communities of practices (CoPs) in organisations. This research project was conducted via observations and participation in the brainstorming sessions, with main units of analysis being CoPs. The objective was achieved by adopting a maturity model of CoPs based on the key dimensions and studying actual experiences in a six (6) year old community of engineers in the Public Works Department of Malaysia (JKR). The units of analysis were the CoP initiatives developed by the organisation. JKR was selected for various reasons. First, they have a large community of technical professionals (4,100) accessing their virtual CoP (JCoP) and have implemented KM initiatives for the past 10 years. Second, it was possible to have direct access to relevant data thanks to the direct contact with the leaders of the studied CoPs, through on-going implementation activities.

3.1 CoP health check initiatives in JKR

The CoP Maturity Model was adopted to determine factors that was required to be analysed further to tune existing CoP strategies and action plans, what it takes to regulate the face-to-face workshops, cultivate awareness and self-sustain JKR's CoPs. We applied the assessment model to a benchmarking study on how the CoP is managed in JKR. The analysis focused on how knowledge and community management is used within the community. Upon completion, gaps were analysed and interventions were explored.

With respect to the data collection strategy, the CoP Maturity Grid was presented to 18 network/community leaders— KM managers who made up of four (4) CoP domains of knowledge, with the aim of assessing the maturity level (from potential to self-sustaining) of the CoP according to the nine assessment factors towards achieving better results from a CoP. These teams were in charge of discussing their experiences and collecting opinions in each community (through an indirect data collection method). They then assessed each item in the maturity grid (Table 1- presented below), based on the options given by the various community leaders.

For each assessment factor, we explained and went through all attributes described in the maturity matrix. The CoP Administrators were made to determine the strengths (strongly disagree - 1 star * to totally agree - 5 stars*) of each attribute, followed by in-depth discussions with the participants in each group to analyse their opinions and identify the most pertinent initiatives practised in supporting the CoP management.

During these sessions, we first asked the group members to describe the status of cultivating CoPs in their respective departments, its profile, the challenges faced in managing the knowledge sharing activities. Finally,

representatives of each domain presented their views on the current scenario and plans that are put in place to reach to the next maturity level.

Table 1: Maturity levels and key dimensions adopted in the JKR CoP

Community of Practice Maturity Model v1.0

Level I Potential	Level II Forming	Level III Maturing	Level IV Self-Sustaining

Rows (dimensions): Leadership/Facilitation, Members/Practitioners, Governance, Enabling technologies/Tools, Knowledge Sharing Behaviour, Professional Development, Organisation Support, Value Proposition, Communication

Assessment Definitions

Leadership/Facilitation	How CoP leadership and members influence and support the ability to 'connect-collect-collaborate'		Enabling Technology/Tools	IT infrastructure (technology and tools) that enables the ability to 'connect-collect-collaborate'	Professional Development	Focus and interest in improving what you know, what you do and how you do it.
Members/Practitioners	Anyone who joins the CoP		Knowledge Sharing Behaviour	Culture, group dynamics, behaviour that promotes and enables knowledge sharing	Value Proposition	The WIIFM for the CoP members and the organisation - they must be aligned
Governance	Environment, rules, guidelines, policies, operations		Organisation Support	Buy-in and support from the organisation reflected in resources, funding, permission, and time allowance that enables CoP success	Communication	How the CoP promotes its value and activities to sustain its efforts

Assessment Value

★ totally disagree   ★★ disagree   ★★★ sometimes   ★★★★ agree   ★★★★★ totally agree

4. Findings

The objective of JKR Health Check and assessment was to determine the level of maturity of their CoPs and explore interventions to ensure the outcomes were maintained. The assessment model included case study discussions to explore how CoPs were measured, usage of a self-assessment CoP survey and finally followed by exploring the CoP key factors by applying the JKR CoP Maturity level.

Findings from the discussions indicated levels between forming and maturing stages for all nine assessment factors. For each assessment factor, gaps were discussed and interventions were proposed to mitigate the gaps.

The interventions and implementation activities discussed were grouped under leadership, organisation, technology and learning dimensions.

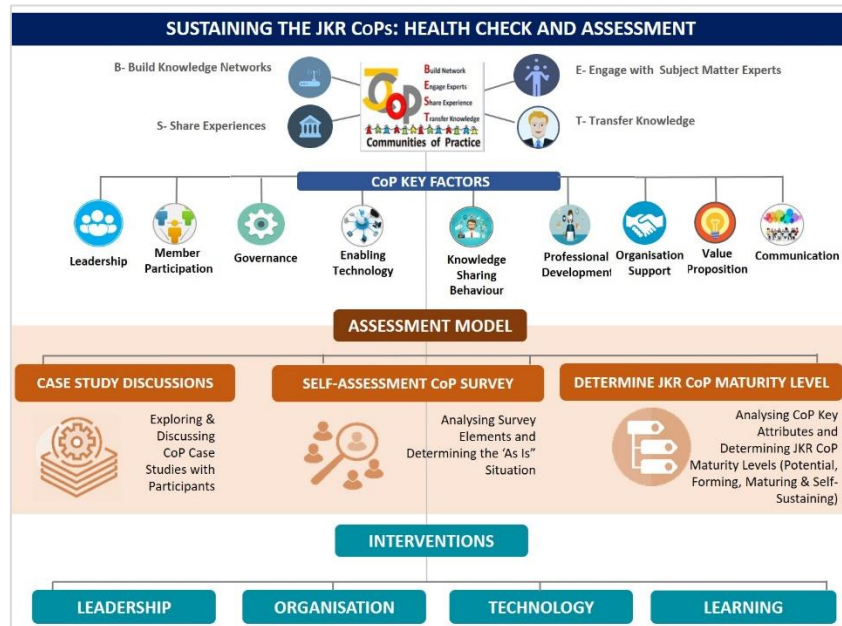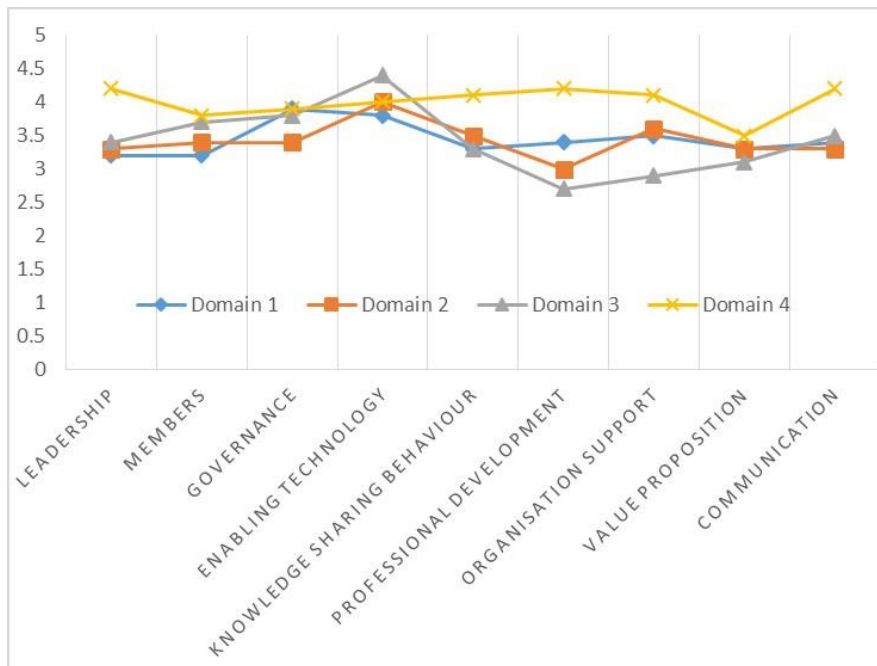**Figure 1**: Proposed CoP assessment model

Figure 2: Findings from the CoP assessment grid

5. Conclusion

Implementing the CoPs in JKR is known to be one of the most strategic initiatives in capturing tacit knowledge in the organisation. The JKR CoPs offer both virtual and face-to-face platforms where sharing and consequently learning takes place collectively. CoP Assessment is indispensable to the success of the knowledge sharing initiatives as they provides an evidence-based assessment of where the organisation needs to focus on, for this form of tacit knowledge capturing technique. The results of this assessment, yielded a number of potential benefits that include the identification of gaps in the key success factors and the subsequent recommendations of interventions that can be used to reach to a self-sustaining stage of the CoPs in an organisation.

It is also worth noting that most of the factors affecting knowledge and its use are continuously changing. In order for the CoPs to produce long-term results, regular implementation of assessment activities could be planned to help organisations to review the progress of qualitative or quantitative variables affecting the organisation's tacit knowledge capturing policy.

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Agent Concept Transformation in Knowledge Management in the Digital Economy

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Abstract: The concept of "agent" is used in the economy traditionally as a person acting on behalf of (in the interests of) another person. As the economic relations become more complicated, the concept adapts to these changes. The context of the digital economy requires knowledge of new approaches from the management and requires to update the agent concept in accordance with the appearance of digital actors. Meanwhile, in the multi-agent simulation approach, no agent concept is determined, only basic properties are specified: autonomy, reactivity, ability for cooperation. This is not enough in order to fully simulate a digital ecosystem based on cluster-network relationships and without clear boundaries. The creation of a category of proactive agent who pursues obtaining of two wins – his/her own one and this one of the principal – opens new possibilities for more adequate simulation of digital ecosystems for the knowledge management purposes.

Keywords: multyagent, proactive agent, digital ecosystem, digital economy

The digital economy can be considered today the most important context for a knowledge management enterprise. The digital economy makes us re-examine a number of categories that have been considered traditional ones for centuries. It makes us exclude the labour from the production factors, use the co-ownership everywhere, think about obligatory payments to citizens and change the essence of money. The issues of subjectivity in the digital economy are also becoming relevant.

The digital ecosystem is already defined, for instance, as a domain of a cluster environment including live, economic and digital species (Mamedova, 2019). See this, hard if not impossible to imagine the ecosystem of tomorrow's enterprise without digital forms – robotic subjects. There exists also a version that the digital ecosystem is defined as the "convergence of three networks: IT network, social one and knowledge sharing network" (Dneprovskaya, 2020). Here, the emphasis is placed also on the entities which build up the interaction in the networks, forming and changing their topology.

The complication of structures and context for knowledge management requires solving the new simulation tasks, which cannot, however, be solved correctly when using inadequate concepts. In particular, when it comes to multi-agent simulation, there is a contradiction between the concept of the agent in economics and this one of the agent in a similar model.

Traditionally, *agent* (from latin agere – to act) means a person acting on behalf (in the interests) of another person (of the principal). An important historical trend for sales agents is the conclusion of transactions on behalf and at the expense of the enterprise. Also, an important feature of the concept "agent" has always been his readiness to take a risk, since he traded independently, not being at the principal's payroll. A special income type – agent fees – were only paid for the transactions successful for the principal. In order to obtain this income, the agent did not need to own fixed assets and generally tangible assets; his main resource was the trusting relationships which the agent manages, maintaining and expanding them.

It was essential to recall the use of the concept "influence agent" (fifth columnist) in the politics, which was especially actively used in the second half of the 20th century. In this case, one can understand that an agent is a person who performs the dissemination of the ideas of any organization among the people who do not belong to this organization. Gradually, such categories as "advertising agent" and "PR agent" became widespread and their remuneration changed its character. The very fact of dissemination of the information about the principal company acquired value, the risk of its inefficiency was already shared between the parties.

The agent concept importance in the digital economy is growing, since therein classic two-way deals become impossible. A model where two parties meet, agree and then fulfill obligations without involving a third party is irrevocably passing (Golokhvastov, 2018). The agents help to find a partner, check his reputation, create a confirmation or guarantee of the transaction, make the payments.

Analysis of the development of the agent concept in the digital economy should be performed at least in three directions.

Firstly, the traditional direction, where the agent is a man (person). Some studies show (Golokhvastov, 2018) that the role of the agents, for example, in real estate, remains high, and thus if they collaborate with a principal organization, the trust in the relations between them is crucial. We observe active transformations of this phenomenon through social networks, blogs and other technologies that allow to the agents to manage the trusting relationships, but in the foreseeable future, the male/female agents will continue to influence demand in the economy.

Secondly, in the digital economy, the concept of a robot-like agent is emerging. Functionally, this is an algorithm pursuing the objectives of the principal, individual or organization, which is the owner of it. It is interesting that such a robot does not pretend to be remunerated in any form, however, it is known aimed to improve its own efficiency.

At least two problems arise here: this one of subjectivity and the other of artificial trust.

It has been noted in (Gadzhiev, 2018), the question of recognizing robots as completely personable and giving them the status of a "person" is not yet relevant, since at this stage of the development of technological progress, their actions are inextricably associated with the manufacturer and the owner. However, in the future, the creation of autonomous artificial intelligence will result in the need to legitimize the recognition of a legal personality in highly developed robotics. In order to create a system of legal regulation in the digital space, it will be necessary to use special constructions that may perhaps completely change legal relations in the society.

The problem of artificial trust consists in that for artificial intelligence it is not yet possible to formalize the mechanism of trust that has been formed in people for thousands of years and cannot be reduced to rational attributes. The experience and formed preferences do not guarantee the confidence forecast in the future. But since the volume of the decisions taken by the robot agents will still grow, the artificial trust will lead to a number of compromises, which may conditionally be called a synthetic choice.

Thirdly, since they often call the digital economy the "platform economy", the remarkable thing is that it actually acts as a "bilateral agent". How can the platform be characterized in the terms of the classical concepts of economics? Traditionally, in the economy, the land has been the main resource and factor of the production. It permitted to extract and reproduce almost all resources for further exchange and distribution. In the digital economy era, the role of land as the production factor cancels out. But since information should have storage and exchange medium, these are the platforms that provide it, acting as a "digital land". We remark here a sharp increase in interest in the use of the term "ecosystem" specifically with respect to digital media, and not in the original sense.

At the same time, it is appropriate to consider the platforms as agents, since they act in the interests of other persons for remuneration. In some cases, they receive remuneration from two parties – both from the service receiver and from the service provider. A very important difference of the platforms from the classic agent consists in the significantly lower risk. Due to the large number of transactions, it does not matter whether a specific one is concluded. The platforms, as aggregators, are often not responsible for the quality of the provider's services, enabling only the possibility of a transaction, but not its content or result.

Finally, we remark that the platforms, as agents, are usually larger than the principals are. In a number of domains, the platforms have an almost exclusive position, which leads us again to the problems of legal (antitrust) regulation.

The increasing complexity and significance of the concept of the agent in the economy begins to contradict the interpretation of this concept in the multi-agent simulation. The fact is that in the multi-agent simulation

approach the concept of the agent (and of the intelligent agent) is not uniquely defined, the basic properties are only specified: autonomy, limited representations and decentralization. For the purposes of simulation, the additions are made, for example, reactivity (task execution, search for the function optimization) and ability to communicate and collaborate with other agents (Rahman, 2014).

Thus, there are certain successes in the use of the multi-agent approach in knowledge management. The work (Yang, 2009) describes a productive attempt to simulate the knowledge ecosystem using the agent approach. The simulation has shown that the activating strategies required for the knowledge ecosystem health support are close to the principles of the real ecosystems. In particular, the subjective openness, diversity, trust, self-control and efficient circulation of knowledge influence positively the viability of the knowledge ecosystem. The paper does not describe the concept of the agent, although it points out its direct relation to the knowledge unit, as author, student, or as collaborator.

The need for efficient knowledge circulation in the digital ecosystem was considered by us earlier (Nefedov, 2018). We analyzed the case of the launch of a neural network managing retail prices by a major Russian retail player. The heterogeneity arisen in the ecosystem – the new knowledge about the use of pricing methods had ceased to be accessible to a number of specialists – did not positively influence the market position and stock price of the enterprise. It should also be noted here the work (Rahman, 2011), where the key emphasis is placed on building of the universal framework which allows to optimize the interaction between the agents at all the main stages of the knowledge life cycle.

An extensive analysis of the multi-agent approach use in the knowledge management was carried out in (Suwardi, 2014). The authors made an interesting definition of the term "multi-agent": "A set of heterogeneous computing objects having their own problem-solving mechanism and the capability to interact with others in order to achieve all objectives" (Dipalokareswara, 2014). Also, while discussing the agent properties, the authors mention the possibility of its flexible behaviour and proactivity.

The proactivity may be in demand in connection with the study (Pavlekovskaya, 2018). The authors, while studying the digital ecosystem concept, point out its cluster-network nature. Indeed, the knowledge ecosystem can be represented as a combination of clusters with the existing interaction between them and the external environment. It may be assumed that the intensity of this interaction is a kind of analogue of achieving the energy ecosystem. In this context, to return to the knowledge management goals – external and internal ones – and to interpret them:

- A) achievement of operational efficiency – due to the development of the digital culture in the organization and all its "clusters";

- B) allow to achieve an external strategic advantage in promoting innovation on the market – the establishment and support of relations with other "clusters" and ecosystems.

Therefore, emerges a direction for the new category of agents – the proactive ones, the essence of which is closer in nature to the original concept of the agent in the economy. Proactive agent:

- creates connections between the clusters

- regulates the terms and conditions of cooperation, customizing the common advantage;

- forms the required culture in the cluster, sets the framework rules;

As we know, the analysis of the terms and conditions of cooperation with a common or private benefit is the subject matter of the game theory. It should be noted that in the works devoted to the game theory application in the knowledge management (Éva, 2010; Safari, 2014), the concept "agent" is not used. In future models, of interest for us will be the models with the agents which are able to customize the game rules, maintaining them at the optimal level for the knowledge ecosystem, taking account of the changing context of the digital economy.

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Issues of Modelling of the Intellectual Capital Reproduction and Increment Processes

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Abstract: The paper contains threshold results and demonstrates a perspective for ongoing research in the field of digitalization of the economy. The relationship between the knowledge economy and intangible and material production is presented. The value of knowledge as a factor of production and goods, as well as a production asset and a production resource is determined. Evolutionary changes in the paradigm of knowledge management in connection with the transition to a new economic formation – the digital economy are outlined. The results of research of the concept and structure of intellectual capital on the basis of a systematic approach are summarized. The problems of both theoretical and applied nature that prevent more effective implementation of the results of the research in the practice of organizations in all spheres of the economy are systematized. The problems are presented in the context of considering the role and place of knowledge in the formation and increment of intellectual capital. The greatest development was the question associated with the development of a model describing the process of increment of intellectual capital through the change of parameters included in the model of describing the increment of knowledge acquired (produced) by the subject of the economy. The perspective direction of research of mutual influence (correlation) of parameters of increment of knowledge and reflecting influence of these parameters on volume and rates of increment of intellectual capital is specified. The methods of mathematical modeling are indicated as tools for the research. This will not only describe the process of increment/change in the volume of intellectual capital using a finite number of parameters, but also explore the possibility of manipulating parameters. The results of the study stated the establishment of mutual correlation with changes in the parameters of the studied processes at various scales. It will allow to form the forecast of behavior of the described processes at controlled change of parameters entering into model. The results achieved will be able to provide an implementation effect for a particular organization through modeling the relationship between knowledge management processes and intellectual capital measurement parameters.

Keywords: intellectual capital, modeling, knowledge economy, digital economy, management economy

1. Introduction

At the turn of the 20th and 21st centuries, the world economy entered the next phase of its development, which is already commonly referred to as the "knowledge based economy". The basic provisions in the field of the knowledge based economy research, as a new direction in the field of economic research, were developed in the works of such researchers as J. Schumpeter, F. Hayek, F. Machlup, P. Drucker. The term "knowledge based economy" was introduced into the scientific circulation by F. Machlup, the author of the book "Production and distribution of knowledge in the USA" (1962), by which Machlup (2012) at that time designated one of the sectors identified by him in his studies of the United States economy.

"The knowledge based economy" is the highest phase (in order of manifestation of the observed dialectical contradictions) in the development of the world economy at the post-industrial stage. Thus, the observed transition to the "knowledge based economy" (KBE) completes the formation and becoming of the fully formed by the end of 20th century specific model of the "information economy", which in turn has replaced the "industrial economy", and the development of information and communications technologies and emergence of the global Internet suggest an appearance of the new economic formation of the "digital economy"(Pavlekovskaya et al, 2018).

In the knowledge based economy, in contrast to the industrial economy, intangible factors of production are becoming increasingly important in ensuring economic growth, and intangible assets are beginning to play an increasingly prominent role in the processes of ensuring sustainable economic development. Global geopolitical changes and increasing competition in the world and regional markets generate a need for improvement of the processes of production and distribution of goods and services, and the consequences of the global financial crisis bring to the forefront the tasks of maximizing efficiency of economic entities' activity due, first of all, to reduction of the production costs, which at the present stage of technological development requires the

constant implementation of innovative approaches and search for new ways of getting sustainable competitive advantages based on new approaches and principles.

2. Materials and methods

The material production begins to depend more and more on intangible assets – on the already available manufacturer's accumulated knowledge presented in the form of lean production processes, technologies and know-how being used, skills of employees, competencies of the workforce at all levels, as well as on ability of enterprises to produce the new knowledge – i.e. this ensuring sustainable competitive advantages knowledge of more advanced ways and methods of production and distribution of products and services, innovative processes for the production of manufactured and developed goods, new technologies which enable maximization of the production efficiency and processes associated with it.

The observed changes in all production areas allow to ascertain with confidence the fact that it is just the production, accumulation, dissemination and application of knowledge to ensure the aforementioned processes of economic growth and development in the context of the emerging "new economy" that begin to play an increasing role in all economic processes and relations.

Thus, in the today's economic conditions, the knowledge begins to act not only as a production resource required for production of products or provision of services, but, *at the same time*, both as a major production *asset* and as a valuable production *resource* used at all stages of the production and distribution. At the same time, the ever-increasing role of knowledge in the processes of both material and intangible production in the service sector, to which currently accrue the main growth of the global economy, triggers demand for knowledge in the above mentioned quality, which allows to consider knowledge as a special *goods* that may be offered in the market, thus representing itself as an independent economic or market category.

Also, the knowledge *as such* considered in this aspect as a specific asset, resource and goods, acts as *product of the intellectual labour*, as a focused human *intellectual activity*, being presented, on the one hand, as in the form of methods and *processes* of production of goods and services developed and created and reproduced by humans (Drucker, 1999), on the other hand, materialized in the form of various production *technologies* and technological solutions, tools and means of maintaining and improving efficiency of production processes in which these technologies are applied and used, as well as in the form of a combination of individual knowledge and skills that is actually acquired by humans which is required for efficient implementation of production activities with a view to support ongoing processes using for this purpose technologies and tools, i.e. in the form of *competencies*.

In one of his works, Karl Marx (1977) postulated: "The development of *fixed capital* indicates to what degree general social knowledge [Wissen] has become a direct force of production, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general *intellect* and been transformed in accordance with it".

Therefore, based on the foregoing and summarizing the above features of such a specific object of the study, as knowledge being considered in this economic aspect as a special economic category that simultaneously has the properties of *asset, resource and product*, it can be safely said that the knowledge in the up-to-date "new" economic conditions acts, on the one hand, as a basis for formation and increment of the fixed capital of enterprises, and on the other hand, may as such be considered as a "new capital" having all its properties and being a product of human intellectual activity, thus forming so-called "intellectual capital".

From the foregoing, immediately apparent becomes the need to study these "new" economic categories, such as the categories of "knowledge" and "intellectual capital" introduced in this quality, in the context of providing an efficient solution of the topical tasks of reproduction and increment of the knowledge and intellectual capital in the conditions of the "new" economy – the knowledge based one (Dneprovskaya, Urintsov, Afanasiev, 2018).

The intellectual capital, as a special economic category, was considered by many scientists and researchers in various aspects. The most significant contribution to the development of problems of formation and management of the intellectual capital, as well as to the issues of popularization of these approaches was made by K. Sveiby, T. Stewart, E. Brooking, S. Wallman, A. Wylman, I. Cuddy, K. Bradley, L. Edvinsson, J. Daum, L.

Prussak. Among the domestic researchers who have contributed to the study of the intellectual capital, special mention should go to the scientists such as N.M. Abdikeev, K.K. Arabyan, A.D. Kiselev, A.L. Gaponenko, T.M. Orlova, G.V. Osipov, V.A. Dresvyannikov, V.S. Efremov, V.L. Inozemtsev, N.N. Karpova, G.B. Kleiner, B.B. Leontiev, V.L. Makarov, B.Z. Milner, T.A. Pogorelskaya, S.V. Pokrovsky, B.V. Salikhov, V.A. Suprun, Yu.F. Telnov, A.I. Urintsov.

Since the appearance of interest to such a research object as intellectual capital, many scientists have conducted numerous studies of various aspects of the formation and reproduction of the intellectual capital, as a source of the enterprise income and as a factor in the development of the economy as a whole. In this interval of time, the impressive results were obtained in understanding of what elements the intellectual capital of the enterprise is made up of and what its structure looks like. Various researchers offer the different views on the structure of intellectual capital. For instance, in the structure of intellectual capital (IC) T. Stewart (1998) identifies such components as "Human capital", "Structural capital" and "Client capital", which, in turn, represent the "materialized" knowledge of the employees of companies and organizations. Following along, E. Brooking divides the intellectual capital into "Human assets", "Infrastructure assets", "Market assets" and identifies as a separate component such entity as "Intellectual property asset" (Brooking, 1998). Other researchers, in one way or another, reproduce in their concepts the components identified by Stuart and Brooking in various combinations, thus determining the qualitative composition of the intellectual capital and the ratio of its components in their relationship (Becerra-Fernandez, Sabherwal, 2015).

However, along with the successes achieved in the study of the intellectual capital and that of the issues of its formation and increment, there exists still a number of problems, both of theoretical and applied nature, which impede the more efficient implementation of the results of the performed research into the practice of enterprises and organizations in all economic realms.

3. Results of the study

In view of the complex character of such a research object as intellectual capital, as well as due to the actual absence of an unambiguous and shared by all researchers interpretation of the basic concepts and definitions being a part of this problem area, the absence of consensus in regards to the "unambiguous definition of the term "knowledge" with reference to consideration of their role and place in the formation and increment of the intellectual capital" (Skorikova, Khromov, Dneprovskaya, 2016), there are a number of significant difficulties in the development of the intellectual capital management methods which enable, when applied, a measurable reproducible and repeatable result reflected in the objective increment of the intellectual capital.

The following problems should be referred, first of all, to the main problems of both theoretical research in the field of IC management and increment and in the field of practical application of the results of these studies:

- elaboration of a research terminology base: strict definition of the concepts included in the thesaurus of the problem domains "knowledge management" and "intellectual capital management", in particular, the concept "knowledge" as an economic category, using the apparatus of formal logic;

- knowledge classification according to the different grounds from the point of view of their representativeness in the structure of the intellectual capital of enterprises (division of various types of the knowledge into types, classes, sections etc. in the context of their use for reproduction and increment of the intellectual capital);

- analysis of the composition and properties of the intellectual capital and / or its components from the point of view of the influence and "weight" of a particular type of the knowledge as an object of management in the economy;

- measurement of the knowledge and intellectual capital;

- record keeping of the knowledge and intellectual capital, as assets or resources, in the context of management of the activities of economic entities (for example, reporting, entering on the balance sheet of enterprise etc.);

- discovery of the factors influencing the change (increment) of the intellectual capital of economic entities and the economy as a whole, in their interconnection and mutual influence, and their parameterization;

- development of an adequate model of the intellectual capital (the IC model of the economic entities), which reflects such its essential elements, on the change of which to the utmost depend the rates of increment (in general - the changes) of the IC and the processes affected by these changes;

- development of the intellectual capital *formation* and *increment* model, which takes account of the discovered factors and identified parameters, in the paradigm of the "knowledge management", i.e. linking the knowledge management processes with the parameters of the intellectual capital measurement.

In this regard, the most promising from the point of view of both theoretical development and the further practical use of the results of the research being performed will be the development of the model that describes, using (mathematical) modelling tools, the process of increment/change of the intellectual capital (indirectly) through the change of the parameters being a part of the models of description of the increment/change of certain types of the knowledge acquired (produced) by the economic entity in the course of the production or other associated activities, given their (parameters and processes) mutual influence (correlation), and reflecting the influence of these parameters on the volume and increment rates of the intellectual capital.

4. Findings

It is expected that with the available tools of mathematical modelling it will be possible to describe adequately and with a certain degree of certainty, using a finite number of parameters, the process of increment/change in the volume of the intellectual capital through one-to-one relationship with the parameters of the process of increment/change in the volume of certain types of the knowledge of the economic entity which directly (or indirectly) influence the volume and rates of increment of the intellectual capital of the given entity. It is also expected that with the help of the model built using the developed tools of mathematical modelling, which has, thus, a known similarity with the reflected intellectual capital increment processes taking place in reality, it is possible to study the nature of the simulated processes, to establish the mutual correlation when changing the parameters of the processes being under study in those or other scales and to make a forecast of the behaviour of the described processes with a known change in the parameters being a part of the model.

However, one of the assumptions of the model being developed is the possibility of representing the volume of the created knowledge in the form of resulting functions with a finite number of parameters, the proof of which will require further research and further work.

Acknowledgements

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