A structured Intellectual Capital: Linking Theory and Practice

Gregorio Martín-de Castro, Ph.D.
Nonaka Centre & Business Administration Department
Complutense University of Madrid, Spain
Agenda

1. IC Bibliometric Analysis: 1990-2016 (1)
2. Intellectual Capital Empirics: A Meta-Review (1)
3. IC and Practice. A remarked experience in Spain

(1) This work is co-authored with Prof. Delgado-Verde and Díez-Vial
1. IC BIBLIOMETRIC ANALYSIS

- Evolution of publications in Intellectual Capital 1985-2016
- Increasing interest, especially since 2006. Period 2010-2012

Source: Thomson-Reuters SSCI, Feb 2017
**AIM:** Quantitative review of existing literature on IC to identify its foundations from a longitudinal perspective.

- Evaluating of **evolution of theoretical foundations** of IC (co-citation analysis)
- Identifying **areas of IC future research** (bibliometric coupling)
1. IC BIBLIOMETRIC ANALYSIS

**Method:**
- Records from Thomson-Reuters SCCI database
- Period: 1990-2016
- Type of documents: papers
- Number of citing documents: 553
- Software: bibExcel and SPSS 22.0

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Citing documents</td>
<td>553</td>
<td>32</td>
<td>128</td>
<td>393</td>
</tr>
<tr>
<td>Cited documents</td>
<td>18274</td>
<td>581</td>
<td>4590</td>
<td>14373</td>
</tr>
</tbody>
</table>
1. IC BIBLIOMETRIC ANALYSIS

- **Co-hesion evolution in the co-citation networks**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average degree</td>
<td>4.13</td>
<td>27.55</td>
<td>65.79</td>
</tr>
<tr>
<td>H-index</td>
<td>5</td>
<td>30</td>
<td>71</td>
</tr>
<tr>
<td>Degree centralization</td>
<td>0.22</td>
<td>0.55</td>
<td>0.58</td>
</tr>
<tr>
<td>Density</td>
<td>0.28</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>Closure</td>
<td>0.40</td>
<td>0.43</td>
<td>0.43</td>
</tr>
<tr>
<td>Average distance</td>
<td>1.92</td>
<td>1.72</td>
<td>1.68</td>
</tr>
<tr>
<td>SD distance</td>
<td>0.76</td>
<td>0.53</td>
<td>0.48</td>
</tr>
<tr>
<td>Compactness</td>
<td>0.54</td>
<td>0.65</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Networks of co-cited references. Unit of analysis: the network. 
Average degree: The average degree in the underlying graph. 
H-Index: the largest number x such that there are x vertices of degree at least x in the underlying graph. 
Density: number of edges divided by the maximum number possible, note the diagonal is ignored. 
Closure: The number of non-vacuous transitive triples divided by number of paths of length 2. 
Average distance: average geodesic distance amongst reachable pairs. 
SD Distance: standard deviation of the geodesic distances amongst reachable pairs. 
Compactness: the mean of all the reciprocal distances.
1. IC BIBLIOMETRIC ANALYSIS: CO-CITATION

Evolution of the foundations of IC.

- **Period 1990-1999: PRACTITIONER –ORIENTED EMERGENCE**
  - Eclectic character of IC Foundations → No clusters
  - A great majority published books for practitioners and academics
  - Models of management and measurement IC, pionnering enterprise cases.
1. IC BIBLIOMETRIC ANALYSIS: CO-CITATION

Evolution of the foundations of IC.

Period 1990-1999: PRACTITIONER –ORIENTED EMERGENCE
1. IC BIBLIOMETRIC ANALYSIS: CO-CITATION

Evolution of the foundations of IC.

- **Period 2000-2009: ACADEMIC FOCUS GROWTH**

- Factors:


  - **Bonti’s School of IC** Bontis (2003); Bontis (2002a; 2002b); Bontis (2001).


  - **Measurement of IC** Lev (2001); Kaplan and Norton (1996); Edvinsson (1997).
1. IC BIBLIOMETRIC ANALYSIS: CO-CITATION

Evolution of the foundations of IC

Period 2000-2009: ACADEMIC FOCUS GROWTH

Strategic Management

Bontis’s School

KBV of IC

HC, SC and Networks

Measurement of IC
1. IC BIBLIOMETRIC ANALYSIS: CO-CITATION

Evolution of the foundations of IC.

- **Period 2010-2016: MATURITY AND REMAINING PROBLEMS**

- Factors:

  - **IC Measurement- Practitioners.** Saint-Onge (1996); Roos (??); Sveiby (1997)
  - **KBV and ICBV.** Reed et al. (2006); Roos (1997); Nonaka and Takeuchi (1995); Kogut and Zander (1992); Grant (1996); Nonaka (1994).
  - **Value Added Intellectual Index.** Maditinos et al (2011); Mavridis (2004); Kamath (2008); Goh (2005)
  - **IC in Dynamic Markets.** Hayton (2005); Dean and Krestchmer (2007); Inkpen (2005); Conner and Prahalad (1996); Leitner (2005)
  - **Critis on IC** Mourtisen (2006); Mourtisen et al (2001); Marr and Chatzkel (2004)
  - **IC Disclosure** García-Meca et al (2005); Cerbioni and Parbonetti (2007); Helay and Palepu (2001); Bukh and Nielsen (2005)
  - **IC as a Strategic Tool:** Bontis et al (1999); Roos et al (2001); Brennan and Connel (2000); Bontis (2004)
Evolution of the foundations of IC: 2010-2016

1. IC BIBLIOMETRIC ANALYSIS: CO-CITATION

(VAIC) Value Added Intellectual Index

IC Dynamic Markets

KBV and ICBV

IC Critics

IC As Strategic Tool

IC Measurement

IC Disclosure

IC as Strategic Tool

VAIC Value Added Intellectual Index

IC Dynamic Markets

KBV and ICBV

IC Critics

IC As Strategic Tool

IC Measurement

IC Disclosure
1. IC BIBLIOMETRIC ANALYSIS: CO-CITATION

Path dependence evolution of co-citation factors

1990-1999
Emergence. Practitioner Focus

2000-2009
Growth. Academic Focus

1990-1999
Consolidation. Measurement, Reporting, Disclosure. Problems
1. IC BIBLIOGRAPHICAL COUPLING

- **NEW TRENDS ON IC:** Bibliographical Coupling 2010-2016

- **Factors (4):**
  
  - **(1) Advances in the Measurement of IC.** Works using new tools and techniques to measure and value IC.
  
  - **(2) Human Capital, Social Capital and HRM.** Analizing the role of HRM practices, social capital and human capital in the structure and configuration of IC.
  
  - **(3) IC and New Business Models.** The role of IC in emerging business (start-ups & entrepreneurship), and new business models: Internet of Things, Cloud-based management, etc.
  
  - **(4) IC Disclosure.** The role of IC dissemination and disclosure, its measurement and comparison, its drivers, etc.
1. IC BIBLIOGRAPHICAL COUPLING

NEW TRENDS ON IC: 2010-2016
2. IC EMPIRICS: A META-REVIEW

- **AIM:** Meta review of existing EMPIRICAL works on IC to identify main aspects and some recurrent problems and prospects signaled in the Third Stage of IC Literature.

- **METHOD:**
  - Source: Thomson-Reuters SSCI, Disciplines of Management, Business, Business & Finance
  - Period: 1990-2016
  - Documents: Papers with an empirical research (qualitative/quantitative) focused on IC
  - A final number of 172 papers have been revisited
2. IC EMPIRICS: A META-REVIEW

Evolution of empirical works on Intellectual Capital 1990-2016

2. IC EMPIRICS: A META-REVIEW

ASPECTS ANALYSED:

- Co-authorship, year, journal
- Empirical work main characteristics:
  - Quantitative/Qualitative
  - Industrial setting
  - Country
  - Data gathering tool
  - IC measurement
  - IC elements analyzed
  - IC drivers
  - IC effects
2. IC EMPIRICS: A META-REVIEW

Co-authorship

Main journals

Ind. Manag. & Dat. Syst.
Jr. Buss. Ethics
Serv. Ind. Jr.
R & D Manag.
Int. Jr. Manag. Tech
Manag. Decis.
Know. Manag. Res. Prac

Theor + Empiric

Empiric
2. IC EMPIRICS: A META-REVIEW

**Continents**
- Europe: 48.1%
- Africa: 0.6%
- Asia: 30.4%
- America: 13.3%
- Oceania: 7.6%

**Field research countries**
- Spain: 25
- USA: 15
- Taiwan: 10
- Australia: 7
- Italy: 4
- UK: 3
- Austria: 2
- Finland: 1
- Mexico: 1
- Portugal: 1

**Industry**
- Multi-Industry: 62%
- Single Industry: 38%

**Industrial Setting**
- University, R&D Centr.: 8
- Banking: 7
- IT & Soft: 6
- Biotech & Pharmac.: 5
- Tourism: 4
- Hospitals: 3
- Insurance: 2
- NPOs: 1
2. IC EMPIRICS: A META-REVIEW

Time series

- Longitudinal: 22%
- Cross-Section: 78%

Type of research

- Quantitative: 79%
- Qualitative: 21%

Main data gathering tools

- Questionnaire: 85%
- Interviews/in-depth: 15%
2. IC EMPIRICS: A META-REVIEW

IC Components analysed

IC Measurement

- Others
- M/B Ratio, Tobins’ Q
- VAIC
- Ratios, Frequenc, etc
- Perceptual scales

IC as a whole
- Technological Capital
- Innovation Capital
- Social Capital
- Organizational Capital
- Relational Capital
- Structural Capital
- Human Capital

Bar chart showing the distribution of IC components and measurements.
2. IC EMPIRICS: A META-REVIEW

IC Drivers

- Knowledge Creation Activities
- Organizational Culture
- Organizational Structure Renewal
- Human Capital
- Board Characteristics
- IT Investments
- Trust & Commitment
- CSR, Environment, Commit and Ethics
- Advanced HRM Practices
- Social Capital, Networks and All.

IC Effects

- Supply Chain
- Funding
- Alliances & Networks
- HRM Practices
- Flexibility and Survival
- Productivity & Efficiency
- Knowledge Creation and Transfer
- Company's Market Value
- Corporate Strategy
- Competitive Advantage
- Innovation
- Firm Performance (wide sense)
2. IC EMPIRICS: A META-REVIEW

EARLY CONCLUSIONS (I)...

- The majority of research output is made on group (2 & 3 co-authors)
- Journal publications:
  - Knowledge Management: KMRP, JoKM
  - Innovation and Techn.: IJTM, R&D Mang, TFSC, RP
  - General Management & Business: MD, EMJ, LRP, AMJ, JBR
  - Information & Management: IM&DS, IJIM
  - Ethics: JoBE
  - Service Industry: SIJ
  - HRM: IJHRM, HRM
  - Accounting: BAR
2. IC EMPIRICS: A META-REVIEW

- **EARLY CONCLUSIONS (II)…**
  - Main Geographical setting: Europe & Asia (Spain, Taiwan)
  - Single industry vs Multi-industry (Majority)
  - Main Industrial setting: Universities and Research Centres, Banking, IT, Biotech & Pharmacy.
  - Main Data time series: Cross-section
  - Main Type of research: Quantitative
  - Main Data gathering tool: Questionnaire
  - IC measurement tool: Perceptual scale (Likert 1-5, 1-7, …)
  - Main IC Components: Human Capital, Structural Capital, Relational Capital
  - Main IC Effects: Firm Performance, Innovation, Competitive Advantage
2. IC EMPIRICS: A META-REVIEW

➢ EARLY CONCLUSIONS (III)...

- **From an Academic point of view:**
  - Little advances in IC Practice: Questionnaires, Likert Scale, SEM/Regression Analyses, Larger sample sizes,..

- **Maybe another analysis could be possible:**
  - Not just the addition of IC elements, indicators
  - Not just statistical treatment of isolated variables (trying to parameterice complex problems)
  - Pursuing the best and unique “way” of reach performance.. (trying to reduce complexity and causal ambiguity)

- **One Possible Solution: QCA (Qualitative Comparative Analysis)**
2. IC EMPIRICS: A META-REVIEW

QCA

Charles C. Ragin
Chancellor’s Professor of Sociology at the University of California, Irvine

Peer C. Fiss
Associate Professor of Management at the University of Southern California

Originally from Sociology and Political Science (25 year-old), its application to Management and Strategy is Relatively New
2. IC EMPIRICS: A META-REVIEW

➢ QCA: SOME IMPORTANT CONSIDERATIONS…

1.- **FOCUS:** Case-oriented (Configuration) vs. Variable-oriented

2.- **INTUITIVE & SIMPLE:** Not complicated (statistically talking…)  
   «True Table»

3.- **IN DEPTH KNOWLEDGE:** Requires deeper understanding of the phenomenon studied (by the researcher/business analist): 
   - Case (typology of configurations) comparison 
   - Construction of variables inside configurations (calibration)

4.- **COMPLEX CAUSALITY:**
   - Comparison of cases as configurations of **different variables** interrelated and interconnected explaining a certain output (success) 
   - **Equifinality:** two or more configurations can lead to a same output.

5.- **SUITABLE FOR SMALL AND MEDIUM SAMPLE SIZE:** Covering a **VERY IMPORTANT GAP** for Strategy and Management Reserach.
2. IC EMPIRICS: A META-REVIEW

- **QCA: SOME IMPORTANT CONSIDERATIONS…**
- Especially useful for Management and Strategy Phenomena:
  - very promising applications in RBV, KBV, **ICBV**
- Sample size is not a problem! And there is a Gap…
- **QCA software** [http://www.u.arizona.edu/~cragin/fsQCA/software.shtml](http://www.u.arizona.edu/~cragin/fsQCA/software.shtml)

---

**Source:** Ragin (2000)
3. IC & PRACTICE: A EXPERIENCE IN SPAIN

A Measurement and Management Model of Intellectual Capital

Euroforum

INTELECT MODEL
(May 19, 1998)

INTELLECTUS MODEL
(2003 & revisited version 2012)

Prof. Dr. Eduardo Bueno

New Advances (2015-now...)

[Diagram showing the INTELLECTUS MODEL]
3. IC & PRACTICE: A EXPERIENCE IN SPAIN

- Development of Intelect & Intellectus Model
  - Workshops focused on IC topics (human capital, relational capital, etc)
  - Social evolutionary approach. ABC Model (Acad, Bus, Consult)

ACADEMICS

UNIVERSIDAD COMPLUTENSE DE MADRID
UNIVERSIDAD AUTÓNOMA DE MADRID
UNIVERSITAT CARLOS III DE MADRID
DEUSTO Universitat de Deusto

BUSINESS

BBVA
renfe
REPSOL
SIEMENS
gasNatural fenosa
KPMG
pwc
Coca-Cola

CONSULTANCY

META
In People We Trust
3. IC & PRACTICE: A EXPERIENCE IN SPAIN

Intellectus Model Five Components

-CH = Human Capital
-CE = Structural Capital
-CR = Relational Capital
-CO = Organisational Capital
-CT = Technological Capital
-CN = Business Capital
-CS = Social Capital

E = Intangible element of the component
V = Variable of the element
I = Indicator of each variable

Source: Knowledge Forum Intellectus-CIC, UAM (2002)
3. IC & PRACTICE: A EXPERIENCE IN SPAIN

A Successful IC Model implemented in many companies

- Since 2003 it has been applied in more than 50 organizations
- Large / SMEs/Start-ups /Public Administrations, etc.
- Europe and Latin America
- Multi-industry: finance, engineering, IT, transportation, energy, biotechnology, education, etc.
A structured Intellectual Capital:
Linking Theory and Practice

Thank you!
Muchas gracias!

Gregorio Martín-de Castro, Ph.D.
gmartinc@ccee.ucm.es

Nonaka Centre & Business Administration Department
Complutense University of Madrid, SPAIN