

Analysing the relationship between Intellectual Capital Management, Technological Orientation, Innovativeness, and Innovative Performance in Knowledge-Intensive Business Services

SUMMARY

Introduction

Intellectual Capital, an organisation's knowledge receptacle and source of intellectual value generation and regeneration, has become a prominent topic in management and business science over the last decades. Numerous scholars have endeavoured to explain the essential contribution intellectual capital makes to a company's business performance and competitive advantage achievement, as well as its impact on the development of innovation capabilities. Effective management of the knowledge encapsulated in various intellectual capital components such as Human Capital, Structural Capital, and Relational Capital in order to achieve business success has become the goal of organisational strategies developed by successful enterprises.

Intellectual capital is a multifaceted and interdisciplinary concept that has been approached from various perspectives. The research in this field has looked into aspects such as intellectual capital definition and description (Edvinsson, 1997; Edvinsson & Malone, 1997; Reed, Lubatkin, & Srinivasan, 2006; Kianto, 2007), intellectual capital taxonomy (Johnson, 1999; Petty & Guthrie, 2000), intellectual capital component measurement (Roos & Roos, 1997), intellectual capital disclosure (Mouritsen, Bukh, Larsen, & Johansen, 2002; Dumay, 2016), the relationships between intellectual capital and knowledge management (Sveiby, 1997; Kianto et al., 2010; Brătianu, 2018a; Vătămănescu, Cegarra-Navarro, Andrei, Dincă & Alexandru, 2020), intellectual capital and innovation (Subramaniam & Youndt, 2005; Buenechea-Elberdin, 2017; Buenechea-Elberdin, Saenz, & Kianto, 2018).

Scientists have repeatedly underlined the interdependent relationship between innovation and technology. In an economic context where both the reliance on technology and (technology-based) innovation have tremendously accelerated, the scarcity of (empirical) research dedicated to

the investigation of the relationship between intellectual capital, technology, and innovation is unexpected. A quick search in the Web of Science database, for example, reveals a total number of 8519 publications related to the terms “Intellectual capital”, compared, e.g., to the topic “knowledge management”, which returns almost 395000 results. However, only half of the research focused on intellectual capital is represented by academic articles, of which half, again, counting 2200 papers, pertains to the management, business or economics literature. As one continues refining the query by searching for associations between intellectual capital, innovation AND technology, the body of works decreases to 220, to abruptly fall to 1 article when the term “KIBS” is added, despite the explosion in the number of knowledge-intensive business services nowadays.

Given the outlined research gaps, the current doctoral research project set out to investigate how Intellectual Capital Management relates to an organisation’s Technological Orientation and Innovativeness, aiming to sustain the Innovative Performance in Knowledge-Intensive Business Services. The research objectives included: conducting a critical review of the scientific literature concerning intellectual capital management, technological orientation, innovativeness and innovative performance with the aim to define better and operationalise the concepts and identify their underlying components; developing a research instrument (questionnaire) to measure the intellectual capital management, technological orientation, innovativeness and innovative performance constructs based on the findings of the literature review; a collection of data from the KIBS sector for statistical analysis on purpose to capture the state-of-the-art in this specific area; testing and validating an integrated research model employing empirical research on purpose to generate knowledge advancements in the field.

Building on this rationale, after introducing the topic in Chapter 1, the thesis discusses in Chapter 2 the theoretical foundations of the firm and competitive advantage through the lens of the intangibles and the relationships between intangible resources management and the management of technology and innovation. It then investigates the concepts to be operationalised, starting with Intellectual Capital Management. An overview is provided on the evolution of the concept, the establishment of the research field, the debates concerning the nature and measurement of the intangibles, the taxonomies proposed over time, the intellectual capital management in practice, the disentangling of the conceptual misalignment of intellectual capital and knowledge management.

Further on, the concept of innovation and the distinction between innovativeness and innovative performance are introduced. The corresponding section presents a review of the extant empirical research on the relationship between Intellectual Capital Management and Innovation. Next, the link between an organisation's Technological Orientation, its innovation potential and intellectual capital development is examined. The section ends with a review of the literature on the relationship between Intellectual Capital Management in Knowledge-Intensive Business Services (KIBS) after the KIBS' characteristics are discussed.

Chapter 3 is dedicated to the detailed presentation of the research design and methodology, which includes both qualitative and quantitative approaches. The section starts with a systematic literature review of the empirical findings on the relationships between Intellectual Capital Management, Technology, and Innovation. Afterwards, it discusses the development of the research instrument, the research model, and the data collection. Chapter 4 addresses the results of the qualitative research as a basis for the quantitative research instrument development. At this moment, the conceptual research model grounded on the literature review is proposed, tested, and validated via advanced statistical techniques and the empirical findings are reported. The study ends with a section on conclusions, theoretical and managerial implications, and research limitations in Chapter 5.

After the concept operationalisation and the development of the hypotheses and research model, it has been decided that a mix-method approach would be the best fit for investigating the linkages between the variables. With this aim, six interviews with middle and senior managers from the KIBS sector have been conducted, each interviewee bringing evidence with regard to strategies, policies and practices concerning intellectual capital management inside their companies. Hence, the qualitative research analysis has provided valuable insight into the topics.

Following the development of a survey instrument and collection of data from a sample of N=103 respondents from KIBS active in the field of IT, financial, and consultancy services, the proposed research model has been tested and validated by employing PLS-SEM statistical analysis. The model employs intellectual capital management as a formative construct to measure the researched structural relationships.

This thesis advances a novel, integrated model for measuring the relationships between Intellectual Capital Management, Technological Orientation, Innovativeness, and Innovation Performance in Knowledge-Intensive Business Services. While the research model is a first of its

kind, it brings to light results that confirm both theoretical and empirical previous findings from several research fields in an integrated manner that has not been utilised before.

It has been found that, as a whole, Intellectual Capital Management significantly affects Innovativeness, Technological Orientation, and Innovative Performance in KIBS, with some components having various impacts in different associations. Theoretical contributions and managerial implications are presented in consequence.

Methodology

Following a systematic literature review of the topics of intellectual capital, technology and innovation, which observed the methodological considerations examined by Tranfield, Denyer and Smart (2003) to achieve an evidence-based approach, this inquiry aimed to identify a relevant body of works regarding the relationship between intellectual capital management, technological orientation, innovativeness and innovative performance. The purpose of the research is to investigate the way an organisation's technological orientation affects intellectual capital management and innovation capabilities to sustain innovative performance.

In accordance with “the research onion” outlined by Saunders et al. (2016), a mixed-method, concurrent strategy combining quantitative and qualitative methods was chosen for this study. This approach fits best the purposes of both analysing numeric data acquired through a survey as well as seeking an in-depth understanding of the extant business practices. While the interview types can vary depending on the methodological choice and the research goals, interviews can take a positivist and deductive approach when the aim is to test the theory, and the interviewer guides the interview process accordingly.

For the purpose of this research, a structured interview approach has been chosen, where a set of ten predetermined and standardised questions has been addressed through electronic means to six participants who agreed to provide insights on the research topics. Nevertheless, a second round of supplementary questions was initiated in all cases, aiming to clarify and detail some ambiguous or underdeveloped replies to increase the reliability and validity of the qualitative data, and thus the process veered towards a semi-structured interview model. From this perspective, the interview method has been utilised within an explanatory research framework to comprehend better the relations between the variables. This approach is in line with the academic recommendations. As recommended by Saunders et al. (2016), to put together a theoretical

framework for employing this research method, one must first determine the main variables, constituents, themes, and topics and the predicted or presumed relationships between them. After the data is collected, a deductive approach can be followed to build explanations.

In this respect, the sample size for the purpose of the current research is deemed sufficient, all the more that the research uses combined quantitative methods. Even though the specific relationships that make the object of study of this thesis have been researched only to a limited extent, the conceptual theoretical underpinnings are ample. Therefore, a smaller sample could be considered adequate. Moreover, the interviewees are in the position to offer quality data, given their professional background, their status, and their experience. All six respondents have significant experience working in technical and professional KIBS, and they hold middle and senior managerial positions.

To sum up, while the information obtained from these interviewees cannot be generalised and applied at the industry level or beyond, it still offers a valuable outlook into the business philosophies and practices of various companies pertaining to the KIBS sector in relation to intellectual capital management, innovation, and technology orientation. These insights were cross-checked with evidence gathered during the quantitative research analysis, which will develop statistical outcomes based on the data acquired by the means of a survey.

For the quantitative research, it has been decided to employ a survey method, as a well-developed questionnaire is an instrument which can be easily understood and can reach a more significant number of respondents, and thus it is fit for statistical analysis. Quantitative analysis is the basis for generalisability, confidence, and prediction calculations (Bryman , 2006, as cited in Saunders et al., 2016). With the view to fulfilling the research goals, a deductive approach will be employed, as data will be collected to test the theory.

The questionnaire has been developed starting from the relevant sources identified during the literature review and initially tested with help from KIBS professionals, who have provided feedback on the clarity and the easiness of responding to the items. In order to assess the relationships between the four variables, namely Intellectual Capital Management, Technological Orientation, Innovativeness and Innovative Performance, the questionnaire items were clustered into six constructs and the Demographics section (with six items). The Intellectual Capital Management construct comprises three sub-constructs, which are Human Capital (HC1 - HC7), Structural Capital (SC1 - SC6) and Relational Capital (RC1 - RC7). These were followed by the

constructs Technological Orientation (TO1 – TO5), Innovativeness (IN1 - IN8) and Innovative Performance (IP1 - IP5). The items in the survey are closed and rating questions, which were deemed to be easy to understand and not cumbersome to answer. A five-point Likert scale was used to assess the replies, ranging from “Strongly agree” to “Strongly disagree”. Items IN6 and IN7 have been reverse-coded.

Following the literature review previously presented, a research model has been developed, and the following research hypotheses have been proposed:

H1. Intellectual Capital Management positively influences Innovative Performance in KIBS.

H1a. Human Capital Management positively influences Innovative Performance in KIBS.

H1b. Structural Capital Management positively influences Innovative Performance in KIBS.

H1c. Relational Capital Management positively influences Innovative Performance in KIBS.

H2. Intellectual Capital Management positively influences Innovativeness in KIBS.

H2a. Human Capital Management positively influences Innovativeness in KIBS.

H2b. Structural Capital Management positively influences Innovativeness in KIBS.

H2c. Relational Capital Management positively influences Innovativeness in KIBS.

H3. Intellectual Capital Management positively influences Technological Orientation in KIBS.

H3a. Human Capital Management positively influences Technological Orientation in KIBS.

H3b. Structural Capital Management positively influences Technological Orientation in KIBS.

H3c. Relational Capital Management positively Technological Orientation influences in KIBS.

H4. Innovativeness positively influences Technological Orientation in KIBS.

H5. Innovativeness positively influences Innovative Performance in KIBS.

H6. Technological orientation positively influences Innovative Performance in KIBS.

The questionnaire was administered online to CEOs, senior and middle managers, as well as to operational staff of KIBS that are active in Romania. A number of 103 responses were received (N=103), which ensures the sample's fit for statistical analysis (Saunders et al., 2016). Non-probability methods have been used, namely snowball sampling.

Research results

Based on the data, most of the respondents pertain to the operational staff in IT and consultancy KIBS, and they are women with a work experience of fewer than 10 years. One-third of the respondents were middle managers, and 25,3 % of them were senior managers and CEOs. Small and medium-sized companies are represented, as well as large companies with over 250 employees.

Data has been analysed with the specialised software SPSS version 28 and Smart PLS version 3 (Ringle, Wende, & Becker, 2015) by employing widely accepted statistical data analysis procedures to screen the data and to reveal relationships and through structural equation modelling (SEM), respectively.

The proposed model has been validated as having a good fit at an SRMR value of 0.071 (< 0.080), as confirmed by Table 23, and the R square adjusted values indicate an explanatory power of 65,6 % for Innovativeness, 69,5 % for Innovative Performance and 78,9 % for Technological Orientation (see Table 24). The effect size (f^2) for constructs is medium-low.

At P value = 0.000, the Path coefficients confirmed significant relationships between Relational Capital Management and Innovative Performance; Structural Capital Management and Innovativeness; Relational Capital Management and Innovativeness; Human Capital Management and Technological Orientation; Innovativeness and Technological Orientation; Innovativeness and Innovative Performance; Technological Orientation and Innovative Performance. Furthermore, Table 22 presents an overview of the significant indirect effects. It has been established that Technological Orientation mediates the relationship between Human Capital Management and Innovative Performance. Innovativeness mediates the relationship between Structural Capital Management, as well as Relational Capital Management, and Innovative Performance. In addition, Innovativeness mediates the relationship between Structural Capital Management and Relational Capital Management with Technological Orientation, while the latter mediates the relationship between Innovativeness and Innovative Performance.

All the hypotheses have been validated except for H1a, H1b, H2a, H3b, H3c. Nevertheless, significant indirect effects have been confirmed for all these hypotheses, but H2a (HCM positively influences Innovativeness in KIBS). Hence, the research model's logic is compelling, since the envisioned relationships capture the logic of a multistep process with interdependent relationships. Thus, various intellectual capital elements have a significant impact on organisational innovation. Strategic technology management supports the development of innovation capabilities and enables leveraging their value-adding potential. Technological orientation and Innovativeness have been demonstrated to affect an organisation's innovative performance, and they all harness the fruits of intellectual capital management.

All the research objectives have been achieved, and the research questions have been answered.

Theoretical contributions and managerial implications

While the study proposes and validates a new research model that has not been tested before, the findings are in line with previous theoretical assumptions advanced by scholars. First of all, the thesis contributes to the literature on the intellectual-based view by proving that intellectual capital management, viewed as an integrated construct comprising human, structural and relational capital management, has a significant effect on Innovativeness through the development of innovative capabilities that are technology-based. Human capital management, Innovativeness and, to a lesser extent, relational and structural capital management combine effects for a powerful impact on Technological Orientation, which is a strategic organisational positioning. This reflects the important relationship between innovation and technology, as envisaged by the academic literature.

Furthermore, in a context where KIBS (and other companies) nowadays compete in a digital environment and digitalisation transforms the social and economic reality, technology and technical knowledge are paramount for a company's success. Structural capital management significantly affects Innovative Performance, pointing again to the importance of organisational resources in achieving business performance. In addition, Innovativeness and Technological Orientation significantly impact Innovative Performance in KIBS, thus confirming the assumptions of the literature dedicated to innovation.

The thesis adds to the literature on the resource-based view and the dynamic capabilities view, as it confirms the role of a company's human and organisational intangible resource

management in attaining competitive advantage through renewed resources that are valuable, rare, imitation adverse and non-substitutable, by using its core competencies to develop innovation capabilities and accomplish innovation-based performance.

This research also contributes to the literature on the knowledge-based view, as it validates in an integrated model the role played in innovation by the management of knowledge and technical knowledge embodied in the employees' competencies and know-how, the management of tacit and explicit knowledge developed by the structural capital, and the management of stakeholder knowledge accumulated by the relational capital.

Finally, the thesis adds to the literature on innovation by bringing new evidence in respect of the relationship between innovation and the role of the intangible resources leveraged by the management of intellectual capital in developing innovation capabilities and capitalising on technological innovation.

For practitioners, this research provides evidence on the importance of developing and effectively managing intellectual capital in all its components – human, structural and relational – with the view to achieve competitive advantage and business performance. The study highlights the value added by adequate management of all intellectual capital elements, as they affect the output of organisational business strategies and processes in an integrated manner. In addition, an organisational technological strategy that is based on up-to-date technologies, the embeddedness of technology in the organisational processes, and the staff's continuous technical/digital upskilling is conducive to competitive advantage and business success in KIBS.

The validated research model attests that high competencies and skills that are continuously renewed through training, as well as the acquisition of digital competencies, play an influential role in generating innovative capabilities that lead to business performance. Furthermore, flexible and efficient business processes, the company's support for informal sharing of business knowledge between employees, the firm's ability to exploit new knowledge to sustain growth, and notably, the organisation's capability to adapt available technologies to its needs are prerequisites for business success in KIBS. Last but not least, promoting an organisational culture of trust and collaboration, making the staff feel valued and satisfied, and effectively using digital technologies for communication are all significant factors in supporting the development of innovation capabilities.

Limitations and future research

This research has several limitations. Firstly, it has to be stressed that the significance of the statistical findings is dependent on the sample size, and the results' explanatory power and effect size cannot be extrapolated to other demographics in different regions or sectors. Secondly, it should be observed that the results of the empirical research can be affected by the respondents' subjectivity in assessing the items and their perception of the reality when providing the answers. Thirdly, this is a cross-sectional study and results concerning, e.g., the innovative performance may be subject to change over a more extended period of time, though items in this construct have inquired about results obtained over time. Finally, given the purpose of the research, the outcome may be limited to the research model design. Future research could attempt to replicate the results by investigating other demographics in other regions and by employing a longitudinal study.
