



Intellectual capital and performance within the banking sector of Luxembourg and Belgium

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Abstract

Purpose – Intellectual capital is widely acknowledged as the most critical resource of modern organizations. Nevertheless, empirical evidence on its actual contribution to the dynamics of the value creation process remains scarce, especially within certain sectors and geographic regions. The purpose of this paper is to address this gap by investigating the effects of intellectual capital and its components on business performance in banking institutions within Luxembourg and Belgium.

Design/methodology/approach – This empirical research is conducted using a dedicated survey instrument administered to over 200 banks. Data analysis is achieved through structural equation modeling.

Findings – Results indicate that human capital contributes both directly and indirectly to business performance in the banking sector. Structural and relational capital are positively related to business performance, though results are not statistically significant. Surprisingly, relational capital has been evidenced to negatively moderate the effect of structural capital on performance.

Research limitations/implications – Traditional limitations of a cross-sectional study apply with respect to the attribution of causality and the time lag effects.

Practical implications – A set of reliable items to capture intellectual capital has been identified and represents actionable knowledge for implementing an intellectual capital dashboard in banks. The dominant role of human capital also provides insight to managers with respect to business performance levers.

Originality/value – Disentangling the effects of intellectual capital on business performance is of the utmost importance in service firms, as they are heavily reliant on intangible resources and capabilities. This research contributes to develop current understanding of these effects. Moreover, interaction effects between human, structural and relational capital have also been uncovered, thus extending prior knowledge on these complex relationships.

Keywords Intellectual capital, Business performance, Services, Banking, Innovation, Luxembourg, Belgium

Paper type Research paper

Introduction

Intellectual capital (IC) is widely acknowledged as the most important source of value creation and competitive advantage (Drucker, 1993; Grant, 1996). However, empirical evidence on its contribution to firm performance remains scarce in certain sectors and geographical regions. A plausible explanation resides in the measurement problems associated with constructs that are not directly observable and identifiable despite



being the most theoretically interesting (Spender and Grant, 1996). This study precisely addresses this gap by empirically scrutinizing the interrelationships as well as the interaction effects between IC components and business performance in banks within Luxembourg and Belgium, which represent a major component of the service industry of that region.

The academic field of IC has grown by leaps and bounds (Serenko and Bontis, 2009; Bontis and Serenko, 2009a; Serenko *et al.*, 2010). Research on the relationship between IC and performance has focussed on various industries including biotechnology (Hermans and Kauranen, 2005) and manufacturing (Tseng and Goo, 2005; Wang and Chang, 2005). Though these sectors certainly deserve further investigation, it is striking that service industries in general and banks in particular represent a fervent research setting as well. First, service industries now include an increasingly larger proportion of productive activities in developed economies (e.g. they now account for over 70 percent of value added in the OECD area). In 2009, business activities and financial services represented about 30 percent of gross value added in the EU-27 (Eurostat). Second, the intrinsic characteristics of services (i.e. co-production, heterogeneity, intangibility, perishability and simultaneity; Fitzsimmons and Fitzsimmons, 2000) imply that IC holds a prevailing role. The extent of IC reliance may vary according to the degree of contact between the service provider and the consumer and to the intensity of knowledge mobilized in the underlying operations. Banks qualify as knowledge-intensive firms as most of their activities are assimilated to work of an intellectual nature. Well educated, qualified and continuously trained employees form the majority of the workforce (Alvesson, 2000). Banking operations usually involve close interaction with customers and rely, to a great extent, on the integration of information and communication technologies (ICTs) for the development of new products and services.

Service firms thus represent fertile ground for understanding the relationship between IC and performance. So far, few studies have concentrated on IC, or some of its components, in financial firms (Bontis *et al.*, 2002; Bontis and Fitz-Enz, 2002; Bontis and Serenko, 2009b). Bontis and his colleagues also explored the mediating effect of organizational reputation on the customer loyalty of a bank (Bontis *et al.*, 2007). Ordonez de Pablos (2004) shed some light on relational capital (RC) in banks. Such efforts undoubtedly contribute to the overall understanding of the effects of IC on performance. Yet, they specifically focus on a selected component of IC. Besides such fragmented research, Cabrita and Bontis (2008) investigated the interrelationships and interaction effects among IC components and performance in the Portuguese banking sector. Their test for interaction effects expanded prior research, conducted in other industries (Bollen *et al.*, 2005; Bontis, 1998; Bontis *et al.*, 2000; Tsan and Chang, 2005) but failed to provide convincing evidence. This study contributes to this research stream and responds to the call for model development and refinement (Cabrita and Bontis, 2008).

Much of the extant research on IC has focussed on nations with a strong tradition of knowledge intensity such as Sweden, Canada, Finland and Australia (Choo and Bontis, 2002). However, this phenomenon has global appeal as evidenced in studies within Mexico (Trevinyo-Rodriguez and Bontis, 2007), Portugal (Cabrita *et al.*, 2007; Cabrita and Bontis, 2008), Ireland (O'Regan *et al.*, 2001, 2005), Germany (Kristandl and Bontis, 2007), Australia (Bontis and Girardi, 2000), Malaysia (Bontis *et al.*, 2000), Egypt (Seleim *et al.*, 2004, 2007), Jordan (Sharabati *et al.*, 2010) and others. Some researchers (Bontis, 2004; Malhotra, 2001) point out that there is also great interest in

IC development at the national level of analysis. However, a comprehensive review of the top global researchers and research institutions world-wide showed that Belgium was ranked 19th and Luxembourg 33rd for IC research productivity (Serenko and Bontis, 2004).

The purpose of this particular research study is to conduct an empirical investigation using a dedicated survey instrument that has been previously psychometrically evaluated (Bontis, 1998). It has since been administered to over 200 banks in Luxembourg and Belgium. These two countries present unique distinguishing features pertaining to their banking sectors. First, private banking and investment management activities are internationally world-renowned in both countries and have experienced drastic growth over the past decade (The Economist). Second, and although there is now a tendency to shift from secrecy to confidentiality concerns, both countries have applied, though to different forms and extents, banking secrecy and expressed reluctance, to say the least, to enroll into international exchange of bank account information programs. Whereas Cabrita and Bontis (2008) concentrate on an economy dominated by retail banking activities, our focus is on institutions whose products and services mainly target international clients, and simultaneously operate in B2C and B2B contexts for custodian and fund administration services.

Theoretical background and hypotheses development

The resource-based view of the firm (Penrose, 1959) argues that differences in profitability across firms can be explained by differences in their portfolio of resources and how these resources are articulated. IC is undoubtedly amongst the most critical resources for knowledge-intensive firms. Though there is still some debate in the academic literature on what IC actually encompasses, a consensus emerges on the fact that it is a multidimensional concept, consisting of the combination of human, structural and relational resources of the firm (Bontis, 1996; Bontis, 1998; Meritum Project, 2002). In this respect, IC is more than the sum of these types of resources, which are strongly intertwined. Additional components have surfaced in the literature. Innovation capital concentrates on R&D expenditures and patenting activities (Tseng and Goo, 2005; Wang and Chang, 2005). Social capital (Inkpen and Tsang, 2005; Nahapiet and Ghoshal, 1998) encompasses the relationships between individuals and their effects (e.g. career advancement) and can be analyzed at different levels: individual, business unit, organizational, network and society. Although multi-level analysis provides much richer perspective, it is theorized to be more difficult with larger organizations (Serenko *et al.*, 2007).

Performance is another central concept in strategic management. Initially apprehended strictly from a financial perspective, the concept has become gradually multifaceted, so as to embrace financial and non-financial aspects (Venkatraman and Ramanujam, 1986). Non-financial performance covers innovation success, market positioning, measured as industry leadership and competitiveness, operationalized as sales growth and overall response to competition.

Human capital (HC) and business performance

Recognized as the central component of IC, HC comprises the knowledge, skills, experiences and abilities of the members of the organization (Edvinsson and Malone, 1997; Roslender and Fincham, 2004). Given its nature, HC is inseparable from its bearer (Fernández *et al.*, 2000) and is neither owned nor fully controlled by the firm

(Edvinsson and Sullivan, 1996). Individual knowledge, expertise and skills represent valuable resources and a source of sustainable competitive advantage, provided that organizations are able to effectively manage and leverage this knowledge and expertise embedded in individuals (Collins and Clark, 2003; Lado and Wilson, 1994).

Traditionally, IC research has hypothesized a positive relationship with business performance. This altruism can be found from the roots of the literature. More recently, effective strategic human resource practices positively affect organizational efficiency and increase performance (Youndt *et al.*, 1996), through their impact on employee development and motivation (Becker and Gerhart, 1996; Guthrie, 2001). Selecting individuals with the proper skills and attitudes is critical for people-based organizations since it enables them to acquire the knowledge they were lacking. Besides knowledge acquisition, exposure to training broadens employee's insight and stimulates exchange of experience and expertise (Chen and Huang, 2009). Higher degree of autonomy and participation in decision-making processes foster increased involvement, commitment and awareness (Glynn, 1996). Combining dispersed knowledge may generate new ideas and potentially result in increased innovativeness (Kogut and Zander, 1996). For firms highly reliant on individual knowledge and expertise, knowledge retention also deserves a specific attention since accumulated organizational knowledge is lost when experienced members leave (Stovel and Bontis, 2002; Bontis and Fitz-Enz, 2002). Employee satisfaction is positively related to organizational commitment (Brooke *et al.*, 1988; Cramer, 1996), motivation (Bontis and Fitz-Enz, 2002) and retention (Mowday *et al.*, 1982). Arguing that knowledge required for banking operations is more complex than in most industries, as operations are highly regulated, diverse, risky by nature and market sensitive, Shih *et al.* (2010) underline the necessity for management teams of the banking industry to systematically manage individual knowledge and experience as a core driver of competitiveness.

Given the close interaction between the supplier and the customer in the co-production process, individuals prevail in services. Much of the value addition and transfer occurs at the interface between the consumer and the organization in services, since emotional intelligence, creativity and product knowledge for frontline employees largely influence customers' perceived value (Namasivayam and Denizci, 2006).

Sharabati *et al.* (2010) demonstrate a positive and significant direct influence of HC on business performance. Most prior studies (Bontis, 1998; Bontis *et al.*, 2000; Cabrita and Bontis, 2008; Cohen and Kaimenakis, 2007; Jardon and Martos, 2009; Tseng and Goo, 2005; Wang and Chang, 2005) indicate that HC exerts an indirect effect. Whether this influence is achieved through relational, structural, innovation or process capital remains largely debated.

Bontis (1998) and his colleague (Cabrita and Bontis, 2008) demonstrate that HC affects both structural and RC, which in turn positively influence business performance. Comparing service and non-service industries, Bontis *et al.* (2000) find that HC is positively related to customer capital in both settings but significantly related to structural capital (SC) in non-service firms exclusively. Cohen and Kaimenakis (2007) reach similar conclusions. Tseng and Goo (2005) conclude that HC exerts a positive influence on organizational, innovation and RC, the latter two directly affecting corporate value. Wang and Chang (2005) evidence the crucial role of HC, as it affects directly both innovation and process capital. The latter is directly related to the customer capital and further to performance. Considering the knowledge-intensiveness and the complexity of private banking and asset management activities, we assume

that HC will play a predominant role on performance and will act as a precursor of other forms of IC.

Against this background, we hypothesize:

H1. HC is positively associated with SC.

H2. HC is positively associated with RC.

H3. HC is positively associated with business performance.

SC and business performance

SC is recognized as the infrastructure that encourages the human resource to create and leverage its knowledge (Edvinsson and Sullivan, 1996). Metaphorically, it represents the backbone of the organization. Unlike HC, SC is owned by the firm and encompasses information systems and databases, routines, procedures, processes that sustain operations as well as creativity and innovation and corporate culture. On a standalone basis, information systems do not affect organizational performance. Yet they contain knowledge accumulated by firms (Stewart, 1997). When coupled with work processes and knowledge development, they play a critical role in leveraging IC into increasing the value of an organization (Soh and Markus, 1995). Routines represent firm-specific knowledge and are the results of its collective learning (Fernández *et al.*, 2000). Thus, they facilitate intra-firm co-ordination and represent its organizational memory. Culture is mirrored in the strategy direction, organization's market orientation, human resource policies and practices, internal networks and information sharing (Band, 1991, cited by Moon and Kym, 2006) and is a source of competitive advantage (Barney, 1986). Furthermore, a climate of trust and co-operation fosters knowledge exchange and combination between knowledge workers and is related to innovative and financial performance (Collins and Smith, 2006).

Since services involve a considerable amount of human activity, they rarely adhere to a predefined, systematic and standardized process. In addition, services are perishable. They cannot be stored and inventoried, unlike goods. Both elements tend to suggest that parts of SC such as procedures are less relevant for services than for their manufacturing counterparts (Kianto *et al.*, 2010).

In contrast, ICT prevail in services and their usage is forecast to further increase. Gago and Rubalcaba (2007) indicate that ICT act as innovative drivers of services when innovation is based on a co-creation process between clients and suppliers. ICT confer a competitive advantage by adding value to customers through online, any time access to banks' offerings (e-banking, mobile banking). ICT lead to productivity gains following their wide diffusion, both within firms and within their networks of suppliers and customers. In banks, back office operations are largely ICT reliant, though human intervention is still required in the vast majority of processes. Moreover, banks face an increasing burden of domestic and international regulations (e.g. Market in Financial Instruments Directive (MIFID) and Basel II). In order to comply with these new requirements, they have to redesign processes and implement or improve monitoring and reporting functions, which are frequently largely ICT dependent.

SC is the only component that directly influences performance, independent of the industry scrutinized (Bontis *et al.*, 2000; Jardon and Martos, 2009). In contrast, Cabrita and Bontis (2008) provide convincing evidence that SC affects performance in banks, both directly and indirectly through RC. Both the complex nature of the

operations and the increased influence of automation lead to the expectation that SC will influence performance directly but also indirectly through its effects on RC.

Accordingly, the following hypotheses are proposed:

H4. SC is positively associated with RC.

H5. SC is positively associated with business performance.

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RC and business performance

RC refers to the ability of an organization to interact with a wide range of external stakeholders (such as customers, suppliers, competitors, trade and industry associations) as well as the knowledge embedded in these relationships (Bontis, 1998; Edvinsson and Malone, 1997; Sveiby, 1997). In the banking industry, professional associations play a prominent role, acting as information provider, catalyst for networking activities and lobbyist toward supranational entities.

Reputation, which reflects the image that stakeholders have of the firm, is another key component of RC. As selling a product to a new customer costs more than to an existing customer, loyalty is essential to business performance. Three main factors affect customer loyalty: satisfaction, commitment and trust. Satisfaction depends on how products and services meet or surpass customer expectations (Kotler and Keller, 2006). Commitment is a vital ingredient of successful relationships leading to loyalty (Berry and Parasuraman, 1991). Trust in a relationship partner acts as a cornerstone for customer loyalty (Chaudhuri and Holbrook, 2001). In the turbulent context of banking services, trust and reputation undoubtedly hold a predominant position in RC.

In banking services, customers participate, to a greater or a lesser extent, in the production process. This particularly applies to private banking packages, which must be customized according to the level of risk aversion, socio-economic situation and expectations of the customers. This close interaction between service providers and customers for the service to be enacted implies an appropriate understanding of customers' needs and a relationship based on mutual trust. Against this background, it is hypothesized that:

H6. RC is positively associated with business performance.

Interaction effects

None of these aforementioned dimensions alone have value by themselves. Value is nurtured through interaction. Nevertheless, empirical evidence, coming from the measurement research stream, on these interaction effects remains rare and relatively mixed. Cabrita and Bontis (2008) find positive but insignificant interaction effects. Investigating US banks, Reed *et al.* (2006) find evidence that HC interacts with organizational capital and internal social capital to positively affect financial performance while interactions between HC and external social capital and between organizational capital and internal social capital have negative effects in personal banks. In contrast, qualitative studies have highlighted the importance of understanding the "business processes that mobilise and transform IC resources into value creation processes" (Cuganesan, 2005, p. 370).

On these grounds, the following hypotheses are formulated:

H7. SC positively affects the relationship between HC and business performance.

H8. RC positively affects the relationship between HC and business performance.

H9. RC positively affects the relationship between SC and business performance.

Figure 1 below summarizes the main and interaction effects hypothesized.

Methodology

This study uses a slightly amended version of the original survey developed by Bontis (1998) and modified by Cabrita and Bontis (2008). In total, 71 items were included in the questionnaire, of which 20 refers to HC, 16 to SC, 25 to RC and 10 to performance. A seven-point Likert-type scale is used, asking the respondent to state to what extent he/she agrees/disagrees with the proposition.

Sample and data collection

The questionnaire was addressed to the whole population of banks registered (i.e. 213 banks in May 2010) in Luxembourg and Belgium and is provided in Appendix 1. To different extents, the banking sector plays a major role in both countries. Business activities and financial services contributed to almost 50 percent (and 30 percent) of total gross value added in Luxembourg (and Belgium), respectively (Eurostat, 2010). The questionnaire was validated through a pilot study consisting of qualitative interviews with bank employees holding a top management position in one of the following departments: organization, quality, internal audit and control, investor relations, marketing, information systems and core banking activities. These interviews aimed at ensuring that the wording was appropriate for the targeted population and that there was no ambiguity in the phrasing of the propositions.

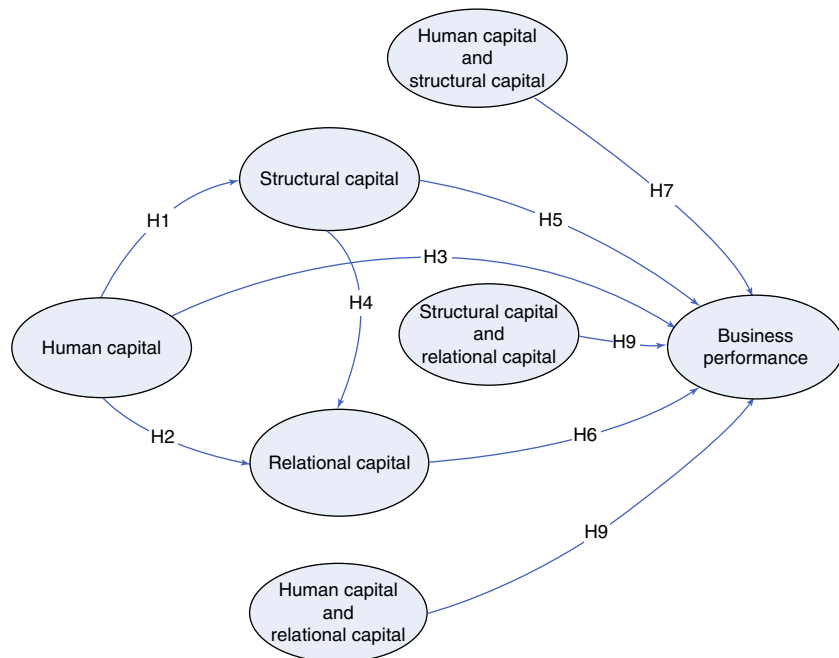


Figure 1.
Hypothesized main and interaction effects

This questionnaire was sent by electronic and postal mail to identified individuals belonging to executive and top levels of management in banks in accordance with the “key informant approach” (Phillips, 1981). In order to increase the response rate, a letter signed by the banking association was appended to the questionnaire. In addition, most of the companies were directly contacted by phone in order to explain the purpose of the questionnaire, the context and to stimulate the respondent to participate to the study. The data collection process started in May and ended in October 2010. A total of 69 completed and useable surveys were collected, corresponding to a final response rate of 32.3 percent.

Data analysis – measurement and structural model

Structural equation modeling allows for the simultaneous testing of hypotheses about the dimensionality of and interrelationships among latent and observed variables (Cooper and Schindler, 2011) using a measurement model and a structural model. The former corresponds to the relationships between the indicators and the latent variables which they contribute to measure. The latter considers the relationships among the latent constructs.

Most common methods to estimate both models focus on the analysis of covariance and the maximum likelihood. An alternative is based on the analysis of variance, which relies on an algorithm entitled Partial Least Squares (PLS). Applying PLS regression to structural equation modeling was originally suggested by Wold (1980) and is a powerful approach widely applied to management research (e.g. Barclay, 1991; Cabrita and Bontis, 2008; Helm, 2005; Jarvis *et al.*, 2003).

In essence, PLS is an iterative combination of principal component analysis relating measures to constructs and path analysis to build a causal chain among the constructs. In the structural model, the relationships between the constructs are deduced from theory and the parameters are estimated by OLS techniques between the selected variables. The primary objective is to maximize the amount of variance explained in the dependent variables, as it assumes that all the measured variance is useful variance to be explained (Chin, 1997). PLS is generally recommended for predictive research, conducted in early stages of theory development. This justifies its application in this context, as literature on the relationships between IC and performance remains scarce. In addition, PLS presents three major advantages.

First, PLS is designed for studies with small samples, in contrast to other methods for which 200 observations are usually requested (e.g. LISREL). The sample size should be at least ten times larger than the largest number of structural paths leading to a latent variable (Chin, 1997). Hence, at least 60 observations are required.

Second, PLS does not require assumptions of normality of data distributions, independence of observations and variable metric uniformity (Sosik *et al.*, 2009).

Third, PLS enables the modeling of indicator variables either formatively or reflectively. Theory should guide the decision whether the latent variable should be modeled with reflective or formative indicators (Fornell and Bookstein, 1982). In this case, all indicators are reflective, as they supposedly mirror the underlying latent variables.

Results and discussion

Table I provides the loadings for the retained items, as computed with SMART PLS 2.0 (Ringle *et al.*, 2005). Only items which showed loading values of at least 0.5 on their respective construct were considered reliable as recommended by Chin (1997) in early

stage theory development. Items that cross-loaded on two constructs were also disregarded.

Taking a closer look at the reliable items across prior studies (Bontis, 1998; Bontis *et al.*, 2000; Cabrita and Bontis, 2008), two noticeable facts arise. First, apart from the Portuguese study, the number of reliable items is comparable across studies. Second, some convergence with this study is observed in terms of retained items for HC. Interestingly, both studies target the banking industry though the core business differs between the empirical settings. However, the set of indicators capturing RC slightly differs while most indicators reflecting SC are distinct from all prior studies, as a strong emphasis is placed on innovation, with three items directly referring to supportive culture for idea implementation and creativity, and appropriate processes and structure to foster the development of new products and services. To some extent, this indicates that the concept of SC reflects strong importance granted to innovation, and departs from its traditional definition, as further discussed hereafter (Table II).

HC items relate to individual-level performance (*H3*, *H11*), competence and quality of the workforce (*H9*), commitment (*H20*), the relevance of employee cooperation (*H4*), individual and collective learning and idea exchange (*H16*, *H17*) and finally, to the ability of the organization to recruit the best talents (*H12*). Quite interestingly, items relating to educational background, knowledge capitalization and some human resources policies, such as succession programs to compensate for involuntary turnover and over reliance on individuals are not retained, as their loadings are below the acceptable threshold.

Few retained SC items relate to actions and processes aimed at leveraging organizational efficiency (*S4*). The use of information systems is deemed relevant (*S12*). This item may be linked to efficiency issues and reflect the accrued automation of banking activities, and more specifically those related to back office operations in fund management. Particular attention is devoted to creativity, idea implementation and activities (*S7*, *S9*, *S13*) that sustain innovation, i.e. the development of new products and services. A plausible explanation for the importance of innovation resides in the characteristics of the sample, consisting mainly of respondents from financial institutions located in Luxembourg. Their operations mostly focus on private banking, wealth and asset management. Such services are usually highly customized and personalized, and thus resonate with the need to innovate either radically or incrementally. A final word should be dedicated to organizational culture and supportive atmosphere (*S16*), an item that had been systematically neglected in prior studies. The same comment applies for the importance of avoiding unnecessary bureaucratic processes (*S14*).

A large number of RC items are reliable. They mainly refer to customer orientation and frequent interaction (*R1*, *R10*, *R14*, *R17*), also for innovation purposes (*R15*) and for

<i>H3</i>	<i>H4</i>	<i>H9</i>	<i>H11</i>	<i>H12</i>	<i>H16</i>	<i>H17</i>	<i>H20</i>
0.6179	0.6924	0.6286	0.7365	0.6027	0.6822	0.7636	0.7196
<i>S4</i>	<i>S7</i>	<i>S8</i>	<i>S9</i>	<i>S12</i>	<i>S13</i>	<i>S14</i>	<i>S16</i>
0.5760	0.7199	0.7578	0.6938	0.5919	0.78222	0.7906	0.5533
<i>R1</i>	<i>R5</i>	<i>R10</i>	<i>R13</i>	<i>R14</i>	<i>R15</i>	<i>R16</i>	<i>R17</i>
0.7096	0.7007	0.5836	0.5999	0.8150	0.6246	0.8012	0.7326
<i>P1</i>	<i>P8</i>	<i>P9</i>	<i>P10</i>				
0.6871	0.9329	0.7296	0.7968				

Table I.
Loadings for
retained items

Canada	Malaysia	Portugal	Belgium	Canada	Malaysia	Portugal	Belgium
	Human capital				Structural capital		
<i>H6</i>	<i>H3</i>	<i>H1</i>	<i>H3</i>	<i>S1</i>	<i>S7</i>	<i>S2</i>	<i>S4</i>
<i>H8</i>	<i>H8</i>	<i>H3</i>	<i>H4</i>	<i>S2</i>	<i>S9</i>	<i>S3</i>	<i>S7</i>
<i>H9</i>	<i>H10</i>	<i>H5</i>	<i>H9</i>	<i>S3</i>	<i>S10</i>	<i>S6</i>	<i>S8</i>
<i>H11</i>	<i>H11</i>	<i>H6</i>	<i>H11</i>	<i>S4</i>	<i>S11</i>	<i>S7</i>	<i>S9</i>
<i>H15</i>	<i>H20</i>	<i>H7</i>	<i>H12</i>	<i>S5</i>	<i>S12</i>	<i>S8</i>	<i>S12</i>
<i>H18</i>		<i>H8</i>	<i>H16</i>	<i>S6</i>		<i>S9</i>	<i>S13</i>
<i>H20</i>		<i>H9</i>	<i>H17</i>	<i>S10</i>		<i>S10</i>	<i>S14</i>
		<i>H10</i>	<i>H20</i>			<i>S11</i>	<i>S16</i>
		<i>H11</i>				<i>S12</i>	
		<i>H12</i>				<i>S15</i>	
		<i>H15</i>					
		<i>H17</i>					
		<i>H18</i>					
		<i>H20</i>					
	Relational capital				Performance		
<i>C1</i>	<i>C5</i>	<i>R6</i>	<i>R1</i>	<i>P2</i>	<i>P2</i>	<i>P1</i>	<i>P1</i>
<i>C5</i>	<i>C6</i>	<i>R8</i>	<i>R5</i>	<i>P3</i>	<i>P3</i>	<i>P2</i>	<i>P8</i>
<i>C6</i>	<i>C7</i>	<i>R9</i>	<i>R10</i>	<i>P4</i>	<i>P4</i>	<i>P3</i>	<i>P9</i>
<i>C8</i>	<i>C10</i>	<i>R10</i>	<i>R13</i>	<i>P5</i>	<i>P5</i>	<i>P4</i>	<i>P10</i>
<i>C9</i>	<i>C14</i>	<i>R11</i>	<i>R14</i>	<i>P6</i>	<i>P6</i>	<i>P5</i>	
<i>C14</i>	<i>C16</i>	<i>R14</i>	<i>R15</i>	<i>P7</i>	<i>P7</i>	<i>P6</i>	
<i>C15</i>	<i>C17</i>	<i>R16</i>	<i>R16</i>	<i>P8</i>	<i>P8</i>	<i>P7</i>	
		<i>R17</i>	<i>R17</i>	<i>P9</i>	<i>P9</i>	<i>P8</i>	
		<i>R18</i>		<i>P10</i>	<i>P10</i>	<i>P9</i>	
		<i>R19</i>				<i>P10</i>	
		<i>R20</i>					
		<i>R21</i>					
		<i>R22</i>					
		<i>R23</i>					

Banking sector of Luxembourg and Belgium

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Table II.
Comparison between reliable items across similar studies

Sources: Bontis (1998) – Canada; Bontis *et al.* (2000) – Malaysia; Cabrita and Bontis (2008) – Portugal; Current study – Belgium/Luxembourg

collecting feedback (R13), retention, trust and loyalty (R9, R16). Some industry peculiarities, which are reflected in the items focussing on relationships with professional associations (R20-R24), are not retained in contrast to the prior findings by Cabrita and Bontis (2008). Being a highly regulated industry, one may suspect that the banking sector needs to develop strong ties with professional associations, which may in turn act as lobbying institutions toward supranational regulatory bodies (e.g. European institutions, Basel Committee). This striking finding may be related to the long lasting predominance of the banking sector and its ability to benefit from small, highly connected pool of leading actors. The dominant role of customer centricity (e.g. understanding and anticipating needs, frequent client interaction) is obvious in the private banking industry, where customization is a key success factor. But beyond marketing strategies, regulation is also a catalyst for customer focus. More specifically, MIFID requires financial institutions to categorize their clients according to various criteria, such as their investment experience, time horizon and risk appetite. Furthermore, financial institutions must ensure that they provide their customers with suitable investment advice according to their profile. The entry into force of MIFID has

significantly leveraged the level of information and understanding of clients that banks must have. A last comment should be devoted to the importance of trust and loyalty, two elements which are crucial in the banking sector.

Reliable performance items refer to self-assessment of industry leadership (P1), overall positioning in the market (P8), success rate in new product launches (P9) and perceived overall business performance and success (P10).

The quality of the measurement model was assessed by considering internal consistency (using Cronbach's α), convergent validity (inspecting individual item reliability, composite reliability and the average variance extracted, as reported in Table III) and discriminant validity (examining the square root of AVE for each construct, as reported in Table IV), which requirements are overall satisfactorily met.

Structural model

The model was first run without the interaction effects in order to identify the contribution of each construct to the performance.

As Figure 2 illustrates, HC has direct, positive and significant effect on both SC (0.633) and RC (0.497). In addition, HC affects indirectly RC ($0.497 \times 0.267 = 0.133$).

Table III.
Indicators for assessing internal consistency and convergent validity

Latent variable	AVE	Composite scale reliability	Cronbach's α
HC	0.534	0.873	0.825
SC	0.508	0.782	0.606
RC	0.554	0.708	0.509
Performance	0.588	0.802	0.642

Table IV.
Indicators for assessing discriminant validity

	HC	SC	RC	P
HC	0.731			
SC	0.633	0.713		
RC	0.666	0.508	0.744	
P	0.228	0.189	0.183	0.767

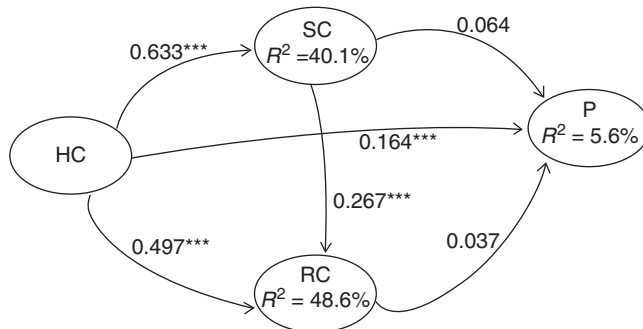


Figure 2.
Main effects

Consequently, HC has a total effect of 0.630 on RC. These findings are concordant with Cabrita and Bontis (2008) although the total effect of HC on RC is slightly lower. Another fact that emerges is that HC largely explains SC (R^2 being about 40 percent). HC has a positive and significant effect on performance (0.164).

The effects on performance are as follows: HC indirectly influences performance through RC and SC: $HC \times RC$ (0.018) and $HC \times SC \times RC$ (0.006); SC also indirectly affects performance, $SC \times RC$ (0.010), while RC directly affects performance (0.037). The influence of RC on performance is noticeable. Its value is clearly much lower than in prior studies, yet it is not significant. Similarly, the influence of SC on performance is not statistically significant. All other relationships are positive, thus confirming the expected signs and are statistically significant.

Figure 3 illustrates the model with the interaction effects. Intermediate models, i.e. with the introduction of one single interaction effect, confirmed the relevance of these individual interaction effects, as the explanatory power of each model increased. The interaction effects have been generated using standardized indicator values.

A first comment should be devoted to the explanatory power of the model, which has drastically increased (33.4 percent). The direct effects of HC on RC and SC remain significant and positive, showing similar values than in the model without interaction effects. In this model, the positive and significant effect of HC on performance is confirmed and increases compared to the model without interactions.

Consistently with the previous model, both SC and RC have positive but insignificant effect on performance.

One interaction effect is significant ($SC \times RC$). The path coefficient shows a negative value, which is a counter-intuitive result. Interestingly, RC consistently affects performance negatively, when interacting with either other component of IC.

In Cabrita and Bontis (2008), the results with interaction effects provided some support for the moderation effects but none of the interaction effects were significant while the explanatory power of their model remained relatively stable. A major outcome of this research therefore lies in the fact that some interaction effects were unfolded.

Statistical significance of path coefficients was assessed using bootstrapping with a recommended sample size of 500. The results are summarized in Table V.

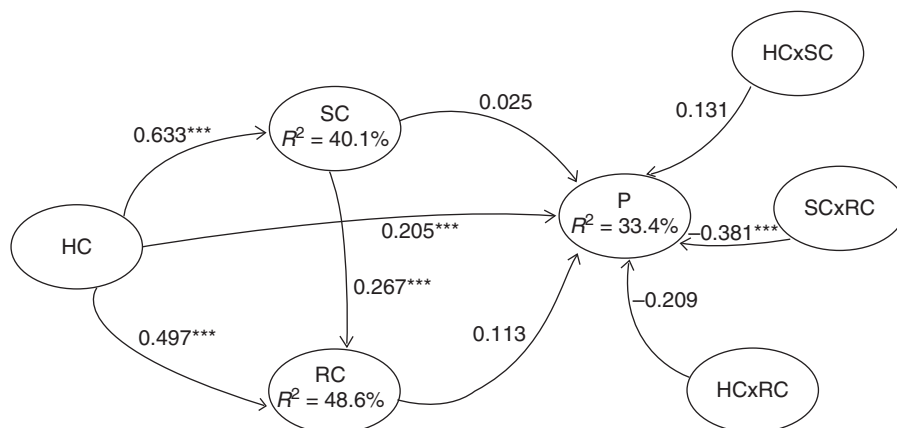


Figure 3.
Main and interaction
effects

Table V.
Summary of the results

Path	Hypotheses	β -path	<i>t</i> -value	Significance	Support	Direction
HC->SC	<i>H1</i>	0.633	16.032	Y	Y	+
HC->RC	<i>H2</i>	0.497	9.618	Y	Y	+
HC->P	<i>H3</i>	0.205	2.158	Y	Y	+
SC->RC	<i>H4</i>	0.267	4.692	Y	Y	+
SC->P	<i>H5</i>	0.025	0.313	N	Y	+
RC->P	<i>H6</i>	0.113	0.777	N	Y	+
SC \times HC->P	<i>H7</i>	0.131	1.183	N	Y	+
RC \times HC->P	<i>H8</i>	-0.209	1.032	N	N	-
RC \times SC->P	<i>H9</i>	-0.381	3.971	Y	N	-

Conclusions and implications

This study primarily aimed to contribute to the relatively scarce empirical literature focussing on quantifying the effects of IC on business performance in the banking industry in Luxembourg and Belgium. More specifically, it explores the interrelationships between the three components of IC and business performance, as well as the interaction effects between them. The empirical investigation has been conducted in two countries where financial services largely contribute to the economy and which banking sector provides favorable settings due to its peculiarities. In doing so, this empirical research responded to the call of Cabrita and Bontis (2008) to further test interrelationships and interaction effects in other geographical contexts so as to extend and generalize the results. The results have implications for theory and practice alike.

First, a set of reliable items has been identified from the measurement model. These items enable to capture human, structural and RC. Limited convergence is observed between these measures and the ones previously validated by Cabrita and Bontis (2008) whose study also focusses on the banking sector. Nevertheless, as previously stated, private banking and wealth management activities which largely dominate this sample require more complex competences, customization of offerings and closer customer interaction than traditional banking packages which are largely commoditized. Making IC components explicit and measurable is a critical step for researchers and practitioners alike, and this empirical research contributes to this aim. Managers can exploit this reliable set of metrics as a basis to elaborate their customized dashboards to evaluate, monitor and report IC, adopting a contingent approach.

Second, this research has shed some light on the interrelationships between the three IC components and business performance. Interestingly, HC is found to be the exclusive direct positive and statistically significant contributor to business performance. This is a new finding in the context of financial services industries, which restates the central role of HC in activities which are highly reliant on individuals. Such finding is consistent with prior studies conducted in other settings (Bontis, 1998; Jardon and Martos, 2009; Tseng and Goo, 2005; Wang and Chang, 2005). Given the dominant role played by HC on structural and RC, investing in its development should have a leverage effect on performance. Relational and SC also positively affect performance, and this finding stresses the importance of customer orientation and interaction, trust and loyalty and the role of innovation.

Third, this study has unfolded interaction effects, which had not yet been uncovered. Results indicate that RC moderates the effect of SC on performance, though

the sign is contrary to our expectations. Likewise, RC has been evidenced to negatively moderate the effect of HC on performance though results are not statistically significant. A plausible explanation for these results resides in the peculiarities of the set of items reflecting SC, which are largely associated to innovation resources and capabilities. In the industry scrutinized, service customization is a critical success factor. This may suggest that an additional construct is needed to capture more typical elements of SC, leaving innovation aspects aside. Altogether, this would suggest that a fourth component may be needed, taking the form of either a fourth capital – innovation (Tseng and Goo, 2005) or renewal capital as Kianto *et al.* (2010) label it – or that of a dynamic capability (Subramaniam and Youndt, 2005; Wu *et al.*, 2007).

To some extent, these results are nevertheless in line with those of Reed *et al.* (2006), who evidenced negative effects of constructs that can be related to the ones used in this study. Nonetheless, they are counter-intuitive. Prior research has emphasized that having the most skilled individuals is not enough. The working climate and the surrounding environment are essential for leveraging individual assets and turning them into valuable sources.

Another explanation for these results may reside in the fact that the underlying elements of IC are closely intertwined and that their “identities are more fragile than what is typically reflected in the literature” (Murthy and Mouritsen, 2011, p. 643) and thus captured in this survey. As Cuganesan (2005) puts it, “IC resources transform each other, often in a pluralistic and fluid manner” (p. 369), thus challenging the analysis of their effects at a more aggregated level. To some extent, we agree with Cuganesan and Dumay (2009, p. 1183, citing Mouritsen *et al.*, 2001 and Mouritsen and Flagstad, 2005) who state that “numbers have been shown to be insufficient for expressing and communicating relationships between IC and value.” Relationships between IC elements and performance may be transient (Mouritsen, 2006) and boundaries between IC components may be blurred and fragile (Murthy and Mouritsen, 2011). Nevertheless and while acknowledging the importance of adopting a contingent approach in uncovering these relationships, we contend that both theory and practice may benefit from a better understanding of the firm-level effect of IC on performance.

This study has some noteworthy limitations. First, it faces the intrinsic limitation of a cross-sectional study in the attribution of causality and the possible time lag effects. Adopting a longitudinal approach to explore the effects of IC on performance would overcome this shortcoming. Second, typical of any survey, this empirical study may face a representativeness bias. However, the response rate is decent for such voluntary surveys.

Directions for further research entail the use of objective measures, either for IC or for performance using financial ratios relevant for banks. Given the broad scope of banking activities, investigating these relationships in specific settings (e.g. private, commercial and retail) may deserve further scrutiny. Further investigation may also include case studies to understand the dynamics of the value creation process in this knowledge-intensive sector.

References

- Alvesson, M. (2000), “Social identity and the problem of loyalty in knowledge-intensive companies”, *Journal of Management Studies*, Vol. 37 No. 8, pp. 1101-1123.
- Band, W. (1991), *Creating Value for Customers: Designing and Implementing a Total Corporate Strategy*, John Wiley & Sons, New York, NY.
- Barclay, D. (1991), “Interdepartmental conflict in organizational buying: the impact of the organizational context”, *Journal of Marketing Research*, Vol. 28 No. 5, pp. 145-159.

-
- Barney, J.B. (1986), "Organizational culture: can it be a source of sustainable competitive advantage?", *Academy of Management Review*, Vol. 11 No. 3, pp. 656-665.
- Becker, B.E. and Gerhart, B. (1996), "The impact of human resource management on organizational performance: progress and prospects", *Academy of Management Journal*, Vol. 39 No. 4, pp. 779-801.
- Berry, L.L. and Parasuraman, A. (1991), *Marketing Services: Competing Through Quality*, The Free Press, New York, NY.
- Bollen, L., Vergauwen, P. and Schnieders, S. (2005), "Linking intellectual capital and intellectual property to company performance", *Management Decision*, Vol. 43 No. 9, pp. 1161-1185.
- Bontis, N. (1996), "There's a price on your head: managing intellectual capital strategically", *Ivey Business Journal (Formerly Business Quarterly)*, Summer, pp. 40-47.
- Bontis, N. (1998), "Intellectual capital: an exploratory study that develops measures and models", *Management Decision*, Vol. 36 No. 2, pp. 63-76.
- Bontis, N. (2004), "National intellectual capital index: a United Nations initiative for the Arab region", *Journal of Intellectual Capital*, Vol. 5 No. 1, pp. 13-39.
- Bontis, N. and Fitz-enz, J. (2002), "Intellectual capital ROI: a causal map of human capital antecedents and consequents", *Journal of Intellectual Capital*, Vol. 3 No. 3, pp. 223-247.
- Bontis, N. and Girardi, J. (2000), "Teaching knowledge management and intellectual capital lessons: an empirical examination of the TANGO simulation", *International Journal of Technology Management*, Vol. 20 Nos 5-8, pp. 545-555.
- Bontis, N. and Serenko, A. (2009a), "A follow-up ranking of academic journals", *Journal of Knowledge Management*, Vol. 13 No. 1, pp. 16-26.
- Bontis, N. and Serenko, A. (2009b), "A causal model of human capital antecedents and consequents in the financial services industry", *Journal of Intellectual Capital*, Vol. 10 No. 1, pp. 53-69.
- Bontis, N., Booker, L.D. and Serenko, A. (2007), "The mediating effect of organizational reputation on customer loyalty and service recommendation in the banking industry", *Management Decision*, Vol. 45 No. 9, pp. 1426-1445.
- Bontis, N., Crossan, M. and Hulland, J. (2002), "Managing an organizational learning system by aligning stocks and flows", *Journal of Management Studies*, Vol. 39 No. 4, pp. 437-469.
- Bontis, N., Keow, W. and Richardson, S. (2000), "Intellectual capital and business performance in Malaysian industries", *Journal of Intellectual Capital*, Vol. 1 No. 1, pp. 85-100.
- Brooke, P.P., Russell, D.W. and Price, J.L. (1988), "Discriminant validation of measures of job satisfaction, job involvement and organizational commitment", *Journal of Applied Psychology*, Vol. 73 No. 2, pp. 139-145.
- Cabrita, M. and Bontis, N. (2008), "Intellectual capital and business performance in the Portuguese banking industry", *International Journal of Technology Management*, Vol. 43 Nos 1-3, pp. 212-237.
- Cabrita, M., Landeiro de Vaz, J. and Bontis, N. (2007), "Modelling the creation of value from intellectual capital: a Portuguese banking perspective", *International Journal of Knowledge and Learning*, Vol. 3 Nos 2/3, pp. 266-280.
- Chaudhuri, A. and Holbrook, M. (2001), "The chain of effects from brand trust and brand affect to brand performance: the role of brand loyalty", *Journal of Marketing*, Vol. 65 No. 2, pp. 81-93.
- Chen, C.J. and Huang, J.W. (2009), "Strategic human resource practices and innovation performance – the mediating role of knowledge management capacity", *Journal of Business Research*, Vol. 62 No. 1, pp. 104-114.

-
- Chin, W.W. (1997), "Overview of the PLS method", available at: <http://disc-nt.cba.uh.edu/chin/PLSINTRO.HTM> (accessed May 10, 2011).
- Choo, C.W. and Bontis, N. (2002), *The Strategic Management of Intellectual Capital and Organizational Knowledge*, Oxford University Press, New York, NY.
- Cohen, S. and Kaimenakis, N. (2007), "Intellectual capital and corporate performance in knowledge – intensive SMEs", *The Learning Organisation*, Vol. 14 No. 3, pp. 241-262.
- Collins, C.J. and Clark, K.D. (2003), "Strategic human resource practices, top management team social networks, and firm performance: the role of human resource in creating organizational competitive advantage", *Academy of Management Journal*, Vol. 46 No. 6, pp. 740-751.
- Collins, C.J. and Smith, K.G. (2006), "Knowledge exchange and combination: the role of human resource practices in the performance of high-technology firms", *Academy of Management Journal*, Vol. 49 No. 3, pp. 544-560.
- Cooper, D.R. and Schindler, P.S. (2011), *Business Research Methods*, 11th ed., Mc Graw-Hill International, Singapore.
- Cramer, D. (1996), "Job satisfaction and organizational continuance commitment: a two-wave panel study", *Journal of Organizational Behavior*, Vol. 17 No. 4, pp. 389-400.
- Cuganesan, S. (2005), "Intellectual capital-in-action and value creation: a case study of knowledge transformations in an innovation project", *Journal of Intellectual Capital*, Vol. 6 No. 3, pp. 357-373.
- Cuganesan, S. and Dumay, J.C. (2009), "Reflecting on the production of intellectual capital visualisations", *Accounting, Auditing & Accountability Journal*, Vol. 22 No. 8, pp. 1161-1186.
- Drucker, P.F. (1993), "The rise of the knowledge society", *Wilson Quarterly*, Vol. 17 No. 2, pp. 52-70.
- Edvinsson, L. and Malone, M. (1997), *Intellectual Capital: Realising Your Company's True Value by Finding its Hidden Brainpower*, Harper Collins, New York, NY.
- Edvinsson, L. and Sullivan, P. (1996), "Developing a model for managing intellectual capital", *European Management Journal*, Vol. 14 No. 4, pp. 356-364.
- Eurostat (2010), available at: <http://eep.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>
- Fernández, E., Montes, J.M. and Vasquez, C.J. (2000), "Typology and strategic analysis of intangible resources. A resource-based approach", *Technovation*, Vol. 20 No. 2, pp. 81-92.
- Fitzsimmons, J.A. and Fitzsimmons, M.J. (2000), *New Service Development: Creating Memorable Experiences*, Sage, Thousand Oaks, CA.
- Fornell, C. and Bookstein, F.L. (1982), "Two structural equation models: LISREL and PLS applied to consumer exit-voice theory", *Journal of Marketing Research*, Vol. 19 No. 4, pp. 440-452.
- Gago, D. and Rubalcaba, L. (2007), "Innovation and ICT in service firms: towards a multidimensional approach for impact assessment", *Journal of Evolutionary Economics*, Vol. 17 No. 1, pp. 25-44.
- Glynn, M.A. (1996), "Innovative genius: a framework for relating individual and organizational intelligences to innovation", *Academy of Management Journal*, Vol. 21 No. 4, pp. 1081-1111.
- Grant, R. (1996), "Toward a knowledge-based theory of the firm", *Strategic Management Journal*, Vol. 17, Winter, pp. 109-122.
- Guthrie, J.P. (2001), "High-involvement work practices, turnover and productivity: evidence from New Zealand", *Academy of Management Journal*, Vol. 44 No. 1, pp. 180-190.
- Helm, S. (2005), "Designing a formative measure for corporate reputation", *Corporate Reputation Review*, Vol. 8 No. 2, pp. 95-109.

- Hermans, R. and Kauranen, I. (2005), "Value creation potential of intellectual capital in biotechnology – empirical evidence from Finland", *R&D Management*, Vol. 35 No. 2, pp. 171-185.
- Inkpen, A.C. and Tsang, E.W.K. (2005), "Social capital, networks, and knowledge transfer", *Academy of Management Review*, Vol. 30 No. 1, pp. 146-165.
- Jardon, C.M. and Martos, M.S. (2009), "Intellectual capital and performance in wood industries of Argentina", *Journal of Intellectual Capital*, Vol. 10 No. 4, pp. 1469-1930.
- Jarvis, C., MacKenzie, S. and Podsakoff, P.A. (2003), "Critical review of construct indicators and measurement model misspecification in marketing research", *Journal of Consumer Research*, Vol. 30 No. 2, pp. 199-218.
- Kianto, A., Hurmelinna-Laukkanen, P. and Ritala, P. (2010), "Intellectual capital in service and product-oriented companies", *Journal of Intellectual Capital*, Vol. 11 No. 3, pp. 305-325.
- Kogut, B. and Zander, U. (1996), "What firms do? Coordination, identity, and learning", *Organization Science*, Vol. 7 No. 5, pp. 502-519.
- Kotler, P. and Keller, K.L. (2006), *Marketing Management*, 12th ed., Prentice Hall, New Jersey, NJ.
- Kristandl, G. and Bontis, N. (2007), "The impact of voluntary disclosure on cost of equity capital and risk premium estimates in a temporal setting", *Journal of Intellectual Capital*, Vol. 8 No. 4, pp. 577-594.
- Lado, A.A. and Wilson, M.C. (1994), "Human resource systems and sustained competitive advantage: a competency-based perspective", *Academy of Management Review*, Vol. 19 No. 4, pp. 699-727.
- Malhotra, Y. (2001), "Knowledge assets in the global economy: assessment of national intellectual capital", in Malhotra, Y. (Ed.), *Knowledge Management and Business Model Innovation*, Idea Publishing Group, London, pp. 329-345.
- Meritum Project (2002), "Guidelines for managing and reporting on intangibles", available at: www.urjc.es/innotec/tools/MERITUM%20Guidelines.pdf (accessed April 21, 2010).
- Moon, Y.J. and Kym, H.G. (2006), "A model for the value of intellectual capital", *Canadian Journal of Administrative Sciences*, Vol. 23 No. 3, pp. 253-269.
- Mouritsen, J. (2006), "Problematising intellectual capital research: ostensive versus performative IC", *Accounting, Auditing & Accountability Journal*, Vol. 19 No. 6, pp. 820-841.
- Mouritsen, J. and Flagstad, K. (2005), "Intellectual capital and paradoxes of managing knowledge", in Czarniawska, H. and Hermes, T. (Eds), *Actor Network Theory and Organising*, Liber and Copenhagen Business School Press, Malmo, pp. 208-229.
- Mouritsen, J., Larsen, H.T. and Bukh, P.N. (2001), "Intellectual capital and the capable firm: narrating, visualising and numbering for managing knowledge", *Accounting Organizations and Society*, Vol. 26 Nos 7-8, pp. 735-762.
- Mowday, R.T., Porter, L.W. and Steers, R.M. (1982), *Employee-Organization Linkages: The Psychology of Commitment, Absenteeism and Turnover*, Academic Press, New York, NY.
- Murthy, V. and Mouritsen, J. (2011), "The performance of intellectual capital: mobilising relationships between intellectual and financial capital in a bank", *Accounting, Auditing & Accountability Journal*, Vol. 24 No. 5, pp. 622-646.
- Nahapiet, J. and Ghoshal, S. (1998), "Social capital, intellectual capital, and the organizational advantage", *Academy of Management Review*, Vol. 23 No. 2, pp. 242-266.
- Namasivayam, K. and Denizci, B. (2006), "Human capital in service organizations: identifying value drivers", *Journal of Intellectual Capital*, Vol. 7 No. 3, pp. 381-393.
- Ordonez de Pablos, P. (2004), "The importance of relational capital in service industry: the case of the Spanish banking sector", *International Journal of Learning and Intellectual Capital*, Vol. 1 No. 4, pp. 431-440.

-
- O'Regan, P., O'Donnell, D., Kennedy, T., Bontis, N. and Cleary, P. (2001), "Perceptions of intellectual capital: Irish evidence", *Journal of Human Resource Costing and Accounting*, Vol. 6 No. 2, pp. 29-38.
- O'Regan, P., O'Donnell, D., Kennedy, T., Bontis, N. and Cleary, P. (2005), "Board composition, non-executive directors and governance cultures in Irish ICT firms: a CFO perspective", *Corporate Governance: International Journal of Business in Society*, Vol. 5 No. 4, pp. 56-63.
- Penrose, E.T. (1959), *The Theory of the Growth of the Firm*, John Wiley, New York, NY.
- Phillips, L.W. (1981), "Assessing measurement error in key informant reports: a methodological note on organizational analysis in marketing", *Journal of Marketing Research*, Vol. 18 No. 4, pp. 395-415.
- Reed, K.K., Lubatkin, M. and Srinivasan, N. (2006), "Proposing and testing an intellectual capital-based view of the firm", *Journal of Management Studies*, Vol. 43 No. 4, pp. 867-893.
- Ringle, C.M., Wende, S. and Will, A. (2005), "SmartPLS", Release 2.0, University of Hamburg, Hamburg, available at: www.smartpls.de (accessed October 23, 2010).
- Roslender, R. and Fincham, R. (2004), "Intellectual capital accounting in the UK: a field study perspective", *Accounting, Auditing and Accountability Journal*, Vol. 17 No. 2, pp. 178-209.
- Seleim, A., Ashour, A. and Bontis, N. (2004), "Intellectual capital in Egyptian software firms", *The Learning Organization: An International Journal*, Vol. 11 Nos 4/5, pp. 332-346.
- Seleim, A., Ashour, A. and Bontis, N. (2007), "Human capital and organizational performance: a study of Egyptian software companies", *Management Decision*, Vol. 45 No. 4, pp. 789-901.
- Serenko, A. and Bontis, N. (2004), "Meta-review of knowledge management and intellectual capital literature: citation impact and research productivity rankings", *Knowledge and Process Management*, Vol. 11 No. 3, pp. 185-198.
- Serenko, A. and Bontis, N. (2009), "Global ranking of knowledge management and intellectual capital academic journals", *Journal of Knowledge Management*, Vol. 13 No. 1, pp. 4-15.
- Serenko, A., Bontis, N. and Hardie, T. (2007), "Organizational size and knowledge flow: a proposed theoretical link", *Journal of Intellectual Capital*, Vol. 8 No. 4, pp. 610-627.
- Serenko, A., Bontis, N., Booker, L., Sadeddin, K. and Harding, T. (2010), "A scientometric analysis of knowledge management and intellectual capital academic literature", *Journal of Knowledge Management*, Vol. 14 No. 1, pp. 3-23.
- Sharabati, A., Jawad, S. and Bontis, N. (2010), "Intellectual capital and business performance in the pharmaceutical sector of Jordan", *Management Decision*, Vol. 48 No. 1, pp. 105-131.
- Shih, K.H., Chang, C.J. and Lin, B. (2010), "Assessing knowledge creation and intellectual capital in banking industry", *Journal of Intellectual Capital*, Vol. 11 No. 1, pp. 74-89.
- Soh, C. and Markus, M.L. (1995), "How IT creates business value: a process theory synthesis", *Proceedings of International conference on Information Systems, Amsterdam*, pp. 29-41.
- Sosik, J., Kahai, S. and Piovoso, M. (2009), "Silver bullet or voodoo statistics? A primer for using the partial least squares data analytic technique in group and organization research", *Group & Organization Management*, Vol. 34 No. 1, pp. 5-36.
- Spender, J.C. and Grant, R.M. (1996), "Knowledge and the firm: overview", *Strategic Management Journal*, Vol. 17, Winter, pp. 5-9.
- Stewart, T.A. (1997), *Intellectual Capital: The New Wealth of Organizations*, Doubleday, New York, NY.

- Stovel, M. and Bontis, N. (2002), "Voluntary turnover: knowledge management friend or foe", *Journal of Intellectual Capital*, Vol. 3 No. 3, pp. 303-322.
- Subramaniam, M. and Youndt, M.A. (2005), "The influence of intellectual capital on the types of innovative capabilities", *Academy of Management Journal*, Vol. 48 No. 3, pp. 450-463.
- Sveiby, K.E. (1997), *The New Organizational Wealth: Managing and Measuring Knowledge based Assets*, Berrett Koehler, San Francisco, CA.
- Treviño-Rodríguez, R.N. and Bontis, N. (2007), "The role of intellectual capital in Mexican family-based businesses: understanding their soul, brain and heart", *Journal of Information and Knowledge Management*, Vol. 6 No. 3, pp. 189-200.
- Tsan, W.-N. and Chang, C.C. (2005), "Intellectual capital system interaction in Taiwan", *Journal of Intellectual Capital*, Vol. 6 No. 2, pp. 285-298.
- Tseng, C.-Y. and Goo, Y.J.J. (2005), "Intellectual capital and corporate value in an emerging economy: empirical study of Taiwanese manufacturers", *R&D Management*, Vol. 35 No. 2, pp. 187-201.
- Venkatraman, N. and Ramanujam, V. (1986), "Measurement of business performance in strategy research: a comparison of approaches", *Academy of Management Review*, Vol. 11 No. 4, pp. 801-814.
- Wang, W.Y. and Chang, C. (2005), "Intellectual capital and performance in causal models: evidence from the information technology industry in Taiwan", *Journal of Intellectual Capital*, Vol. 6 No. 2, pp. 222-236.
- Wold, H. (1980), "Model construction and evaluation when theoretical knowledge is scarce: theory and application of partial least squares", in Kmenta, J. and Ramsey, J.B. (Eds), *Evaluation of Econometric Models*, Academic Press, New York, NY, pp. 47-74.
- Wu, S.H., Lin, L.Y. and Hsu, M.Y. (2007), "Intellectual capital, dynamic capabilities and innovative performance of organisations", *International Journal of Technology Management*, Vol. 39 Nos 3-4, pp. 279-296.
- Youndt, M.A., Snell, S.A., Dean, J.W. and Lepak, D.P. (1996), "Human resource management, manufacturing strategy, and firm performance", *Academy of Management Journal*, Vol. 39 No. 4, pp. 836-866.

Further reading

- Fasnacht, D. (2009), *Open Innovation in Financial Services: Growing Through Openness, Flexibility, and Customer Integration*, Springer, Berlin.

Appendix 1. Introducing the concepts

Most commonly accepted definitions of Intellectual Capital encompass three components: (1) Human Capital; (2) Structural Capital; and (3) Relational Capital.

Human capital refers to the competence of firm's members, including individual knowledge, skills, experience, expertise and abilities.

Structural capital can be viewed as the "backbone of the organization", its strategies, processes, policies and systems.

Relational capital relates to the relationships between the focal firm and its environment, e.g. customers, suppliers, regulatory bodies.

This study aims to disentangle their effects on business performance, as per the perception of the respondent. Ten items represent the different facets of business performance and are detailed in Appendix 3.

Appendix 2. Questionnaire

The following 71 items tap into Intellectual Capital. Please do not forget to respond as a representative of your organization.

Please make sure to answer each question and circle the correct response based on how you feel about the statement. The scale should be understood as follows: 1=strongly disagree, 7=strongly agree

1.	A poll of our customers would indicate that they are generally satisfied with our organization	1	2	3	4	5	6	7
2.	The competence of our employees as a whole is equal to the most ideal level we could ever hope to achieve	1	2	3	4	5	6	7
3.	Our organization has the lowest costs per <i>transaction</i> of any in the industry. NOTE: a <i>transaction</i> is defined as a completed unit of business exchange (i.e. the processing of a loan, the provisioning of service such as advice on financial planning in a private bank/asset management structure, the achievement of investment operations, the processing of an insurance contract)	1	2	3	4	5	6	7
4.	We have continually been improving our costs per revenue euro	1	2	3	4	5	6	7
5.	When an employee leaves the firm, we do not have a succession training program for his/her replacement	1	2	3	4	5	6	7
6.	We have greatly reduced the time it takes to resolve a customer's problem	1	2	3	4	5	6	7
7.	Our business planners are continually on schedule with their new business development ideas.(i.e. we generally meet target dates)	1	2	3	4	5	6	7
8.	We have been continuously improving our cost income ratio over the past few years	1	2	3	4	5	6	7
9.	Our cost income ratio is the best in our market segment	1	2	3	4	5	6	7
10.	The firm gets the most out of its employees when they cooperate with each other in team tasks	1	2	3	4	5	6	7
11.	Our market share has been continually improving over the past few years	1	2	3	4	5	6	7
12.	Our market share is the highest in the industry	1	2	3	4	5	6	7
13.	Our organization does not foster the development and maintenance of internal relationships among various groups	1	2	3	4	5	6	7

(continued)

Table AI.

14.	The time it takes to complete one whole <i>transaction</i> has been decreasing over the past few years	1	2	3	4	5	6	7
15.	The time it takes to complete one whole <i>transaction</i> is the best in the industry	1	2	3	4	5	6	7
16.	Our organization consistently comes up with great new ideas	1	2	3	4	5	6	7
17.	We implement a large portion of our great new ideas	1	2	3	4	5	6	7
18.	The longevity of the relationships we have with our customers is admired by others in the industry	1	2	3	4	5	6	7
19.	Our organization thrives on maintaining the most positive value-added service of any firm in the industry	1	2	3	4	5	6	7
20.	The firm supports our employees by constantly upgrading their skills and education whenever each of them feels it is necessary	1	2	3	4	5	6	7
21.	Our company supports the development of new ideas and products	1	2	3	4	5	6	7
22.	Our company develops more new ideas and products than any other firm in the industry	1	2	3	4	5	6	7
23.	The employees of our firm are considered creative and bright	1	2	3	4	5	6	7
24.	Our customers are loyal to our company, more so than to any other in the industry	1	2	3	4	5	6	7
25.	When it comes to new business, our customers have increasingly selected us versus our competitor's customers over the past few years	1	2	3	4	5	6	7
26.	Our employees are widely considered as the best in the whole industry	1	2	3	4	5	6	7
27.	Our organization prides itself on being market oriented	1	2	3	4	5	6	7
28.	Our organization prides itself on being efficient	1	2	3	4	5	6	7
29.	When someone comes up with a great idea, we do not share the knowledge within the firm as much as we should	1	2	3	4	5	6	7
30.	We continually meet with customers to find out what they want from us	1	2	3	4	5	6	7

Table AI.

(continued)

31.	Data on customer feedback is disseminated throughout the organization	1	2	3	4	5	6	7
32.	Our employees are satisfied with our organization	1	2	3	4	5	6	7
33.	Our employees consistently perform at their best	1	2	3	4	5	6	7
34.	Our recruitment program is comprehensive, we are dedicated to hiring the best candidates available	1	2	3	4	5	6	7
35.	Our data systems make it easy to access relevant information	1	2	3	4	5	6	7
36.	If certain individuals in the firm unexpectedly left, we would be in big trouble	1	2	3	4	5	6	7
37.	Most employees in the firm generally understand our targeted market segments and customer profiles	1	2	3	4	5	6	7
38.	We generally do not care about what the customer thinks or wants from us	1	2	3	4	5	6	7
39.	Employees in this organization rarely think their actions through	1	2	3	4	5	6	7
40.	Employees generally just do things without much energy	1	2	3	4	5	6	7
41.	Our systems and procedures support innovation	1	2	3	4	5	6	7
42.	This organization is a “ <i>bureaucratic nightmare</i> ”	1	2	3	4	5	6	7
43.	Individuals learn from others	1	2	3	4	5	6	7
44.	Employees are excited to voice their opinions in group discussions	1	2	3	4	5	6	7
45.	We capitalize on our customers’ wants and needs by continually striving to make them satisfied	1	2	3	4	5	6	7
46.	We often launch something new only to find out that our customers do not want it	1	2	3	4	5	6	7
47.	The organization gets the sense that it is getting the most out of its employees	1	2	3	4	5	6	7
48.	Our organizational structure keeps employees from being too far removed from each other	1	2	3	4	5	6	7

(continued)

Table AI.

49.	The organization's culture and atmosphere is supportive and comfortable	1	2	3	4	5	6	7
50.	Certain individuals in the firm seem to bring others down to their level	1	2	3	4	5	6	7
51.	We feel confident that our customers will continue to do business with us	1	2	3	4	5	6	7
52.	We get as much feedback out of our customers as we possibly can under the circumstances	1	2	3	4	5	6	7
53.	Our employees generally give it their all which makes this firm different from the others in the industry	1	2	3	4	5	6	7
54.	If a competitor launches an intensive campaign targeted at our customers, we implement a response immediately	1	2	3	4	5	6	7
55.	We frequently discuss strengths and weaknesses of our competitors	1	2	3	4	5	6	7
56.	We maintain regular contact with the sector associations – domestic and non-domestic – aiming to share sector's information	1	2	3	4	5	6	7
57.	Information from sector and associations is considered important	1	2	3	4	5	6	7
58.	Information from sector associations is considered in our strategic decisions	1	2	3	4	5	6	7
59.	Our bank's culture supports the sharing of information from sector association	1	2	3	4	5	6	7
60.	Information about competitors is shared across the bank	1	2	3	4	5	6	7
61.	Our competitors are considered a source of innovation	1	2	3	4	5	6	7

Table AI.

Appendix 3. Business performance

Please answer the following items with regards to your organization's performance **relative to your key competitors in the industry over the last few years.**

(Please make sure to answer each question and circle the correct response based on the number that best corresponds to your answer)

[1 = bottom decile, 10 = top decile]

Industry leadership	1	2	3	4	5	6	7	8	9	10
Future outlook	1	2	3	4	5	6	7	8	9	10
Net profit	1	2	3	4	5	6	7	8	9	10
Liquidity ratio	1	2	3	4	5	6	7	8	9	10
Return on equity	1	2	3	4	5	6	7	8	9	10
Banking income	1	2	3	4	5	6	7	8	9	10
Cost-income ratio	1	2	3	4	5	6	7	8	9	10
Overall response to competition	1	2	3	4	5	6	7	8	9	10
Success rate in new product/service launches	1	2	3	4	5	6	7	8	9	10
Overall business performance and success	1	2	3	4	5	6	7	8	9	10

Table AII.

Appendix 4. Further information

This section of the survey is for administrative purpose only. Please reply and provide your contact details if you want to be informed of the results. If you are not absolutely sure about an item, please just approximate. Responses are confidential.

Financial institution name

Total # of employees (end of 2009)

Profit for FY 2009

€

Table AIII.

Please feel free to comment on questionnaire items or make suggestions about missing items in the following textbox.

About the authors

Dr Anne-Laure Mention is leading a research unit focussing on innovation economics and management within the Public Research Centre Henri Tudor, Luxembourg. She is actively involved in research projects, mainly focussing on innovation and performance measurement and management in the financial and business-to-business services industries. Her research interests mainly concentrate on open and collaborative innovation, intellectual capital measurement and management, innovation and technology management. She has been a Visiting Researcher at McGill University, Canada and Ferrara University, Italy. She received an IBM Faculty Award for the project entitled "Towards accrued transparency of operations in the fund industry" in 2011 focusing on organisational innovation. She is also a founding member of WICI, the Deputy Head of the ISPIM Advisory Board Member. Anne-Laure Mention is the corresponding author and can be contacted at: anne-laure.mention@tudor.lu

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