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The impact of intellectual capital management on company competitiveness and financial performance

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Abstract
Most of the existing research on intellectual capital (IC) has concentrated on identifying the key intangible resources and measuring their level in various contexts. However, the extent to which IC is being managed in companies and how IC management impacts on organizational performance have been relatively neglected issues. To bridge these gaps, the current paper examines how IC management affects company performance based on data collected from Finnish, Russian, and Chinese companies. The results demonstrate the importance of a conscious and systematic management of organizational knowledge for the company bottom line.
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Introduction

As knowledge has replaced land, labor, and physical capital as the most important factor of production (Drucker, 1988), it has been widely agreed that knowledge is the new fundamental basis of competition: it is the most important factor in the creation of economic value and competitive advantage (e.g., Drucker, 1993; Stewart, 1997). Nowadays knowledge, in its different forms, processes, and containers, is the main asset for all kinds of organizations.

As knowledge has become the primary driver of competitive advantage in the contemporary economy, new approaches to understand and measure organizational performance are needed that recognize the knowledge-based aspects of value creation. When knowledge is examined from a value creation perspective, it is understood as intellectual capital (IC). IC comprises the valuable knowledge-based resources and the management activities related to them. The main intangible value drivers are typically seen in terms of human resources, structural resources, and relationship networks, and the management activities span strategy formulation and implementation used for better leveraging these resources (e.g., Bontis, 2001; Guthrie, 2001; Edvinsson & Malone, 1997).

IC research attempts to overcome the limitations of conventional indicators that are used to explain, measure, and manage organizational performance. It tries to examine intellectual wealth from a more comprehensive perspective and to construct methods for identifying, describing, measuring, reporting, and valuating intangibles in organizations, regions, networks, and nations.

Looking at the bulk of studies done in the IC tradition, one can notice an impressive amount of conceptual work on the nature and constituent elements of IC (e.g., Edvinsson & Malone, 1997; Sveiby, 1997), as well as tools for measuring and reporting intangibles (e.g., Viedma, 2000; Andriessen, 2003). Many case-based and large-sample empirical studies on the level of intangibles and their performance implications in various contexts (Reed *et al*, 2006; Longo *et al*, 2009; Hsu & Sabherwal, 2011) have also been conducted. Based on this extensive evidence, it seems that the possession of intangible assets leads to superior organizational performance, that is, a high level of IC is correlated with high performance (Menor *et al*, 2007; Hsu & Sabherwal, 2011).

However, while there is a great deal of research reporting the methods for managing IC, there are only a few studies that have examined to what extent organizations actually are using these methods (Kujansivu, 2008). Moreover, from a performance aspect, while the *level* of IC and how it impacts on performance have been thoroughly researched, only a handful of studies have empirically examined how the strategic management of intangibles impacts value creation. Most of the existing studies have contented themselves with assessing the value and/or level of existing intangible assets and then correlating this with performance outcomes. There are far less studies examining to what extent these (more or less existing) intangible assets are consciously managed in firms, and furthermore, how their management impacts on the success of organizations.

To bridge these gaps in the existing knowledge, the current paper examines how IC management, that is, the strategic planning and implementation activities related to intangibles, impacts on firm competitiveness and financial performance. The idea is to critically explore the key *raison d'être* of IC as a managerially relevant, actionable concept (rather than just an academically descriptive issue), whether its management has implications for the company bottom line or not.

Management of IC as a competitive asset

The field of IC is multidisciplinary, spanning from management accounting to financing, leadership, and even philosophy (Marr, 2005), and the views of the nature and composition of IC tend to vary from one author to another. One definition of IC is that it is the possession of the knowledge, applied experience, organizational technology, customer relationships, and professional skills that provide a company with a superior competitive position (Edvinsson & Malone, 1997). According to another definition, IC consists of the knowledge-based resources that contribute to the sustained competitive advantage of the firm, or simply knowledge that can be converted to profits (Sullivan, 1998).

It seems that there is an emerging standard to divide IC into three types of elements: human capital, structural capital, and relational capital (e.g., Bontis, 2001; Guthrie, 2001). Most of the existing research on IC is concentrated on examining the level and/or value of some/all of these IC elements, as well as their implications for organizational performance.

Human capital comprises the knowledge, education, skills, and characteristics of the members of the organization (see, e.g., Edvinsson & Malone, 1997; Meritum Project, 2002). It thus stands for the abilities of organizational actors to take skillful action and thereby produce value for the firm. Human capital is not owned or even controlled by the firm in the strict sense, and it is generally considered as the most significant element of IC: nothing can happen in the firm without it. The structural capital of the organization is defined as the knowledge that stays in the firm when the members of the staff leave (e.g., Edvinsson & Malone, 1997; Meritum Project, 2002). Structural capital falls into two categories: It includes the outcomes and products of knowledge conversion, such as documents, databases, process descriptions, and the intellectual properties of the firm such as patents, copyrights, trade secrets, and trade and service marks. On the other hand, it also includes the infrastructural assets comprising the context in which the organizational activities take place. Thus, structural capital represents both the context and the outcome of human capital. Relational capital refers to the ability of an organization to interact in a positive manner with the external stakeholders and thereby to actualize the wealth creation potential of human and structural capital. It includes resources related to the firm's external relationships, such as its connections with its customers, suppliers, partners, and the local community, and the knowledge embedded in these relationships (Sveiby, 1997; Edvinsson & Malone, 1997; Bontis, 1998).

However, drawing from the dynamic interpretation of IC (Kianto, 2007) one can argue that IC, or more generally organizational knowledge, is not only about what the organization possesses or has, it is also about what the organization does. From this perspective a key distinction is drawn between the level of IC elements possessed by a firm and the activities conducted to manage them. In this sense, the dynamic perspective draws attention to *conscious and systematic managerial activities* for better dealing with intangibles in a firm.

Sullivan (1999) defines IC management to be about balancing and aligning the IC of the company with the company's vision. Nickerson & Silverman (1997, p. 321) state that IC management involves 'the establishment of monitoring, measurement and management practices that secure intellectual assets for use by the company and that scan the environment for competitive threats to/opportunities for these intellectual assets.' In sum, seen as a managerial practice, IC management consists of the strategic planning and implementation activities related to intangibles, and its explicit goal is the improvement of the companies' value creation capacities (Wiig, 1997; Viedma, 2004; Kujansivu, 2009).

As a concept, IC management is very close to the concept of knowledge management (KM) that concerns

identifying and leveraging the knowledge in an organization to help the organization compete (e.g., Wiig, 1997; Ståhle & Grönroos, 2000; Alavi & Leidner, 2001). Both approaches are emergent and lack widely accepted definitions, but as Kujansivu (2008) explains, when knowledge management only covers activities dealing with information and knowledge on the tactical and operational levels, IC management focuses on the strategic level and extends beyond information and knowledge to issues such as brands, customer relationships, and business processes.

The management of IC can be defined as the strategic planning and implementation activities related to the knowledge-based assets in the firm. Kujansivu (2008) states that the managerial activities related to IC management include, for example, the identification, measurement, valuation, acquisition, and reporting of IC. The Knowledge Audit Cycle by Marr & Schiuma (2001) suggests that IC management consists of four activities: defining the key knowledge assets, identifying the key knowledge processes, planning actions for developing the processes, and finally implementing the actions and monitoring the resulting improvement in the knowledge assets. Similarly, the Meritum project guidelines (2002) represent the management of IC including three phases: the identification of strategic intellectual assets and activities related to them, measuring them, and monitoring their development.

In a similar vein, though not using IC terms, Zack (1999, 2002) suggests that just *having* knowledge resources does not ensure that an organization makes the best investment of these resources; moreover, it does not ensure that it possesses the *right* knowledge and *manages* it the right way. Therefore, he recommends that a company first identifies what knowledge it needs based on its strategic priorities (develops what he calls the 'knowledge based strategy'), and only then decides how to manage this knowledge (develops the 'knowledge management strategy'). From this perspective, the KM strategy, even though called 'strategy', indeed represents more operational, tactical decisions, as Kujansivu (2008) claims. For example, Hansen *et al* (1999) have provided a typology of KM strategies. The codification strategy focuses on managing elicitation and codification of knowledge assets, their storage and dissemination through information and communication technological systems, and ascertaining their efficient re-use. The personalization strategy, on the other hand, capitalizes on the tacit and dispersed nature of knowledge and focuses on activities to ensure and support the sharing and co-development of contextualized knowledge. These strategies propose distinct sets of managerial practices companies can use to manage their knowledge, but they skip the question of whether this knowledge is actually the right one from a strategic perspective. Zack (1999) offers two analytical tools aimed to help managers to develop a well-informed strategy for managing its knowledge resources: knowledge positioning against competitors and knowledge-based SWOT analysis. Viedma's IC Benchmarking System (Viedma, 2004; Martins & Viedma, 2006) is also a tool for building an IC strategy for a firm, including external benchmarking with best-in-class competitors. The IC Benchmarking System seems to be the only strategy formulation method suggested in the IC literature.

However, the management of IC can also be successfully conducted without consciously utilizing the methods constructed within the IC framework. Kujansivu (2009) argues that intellectual capital management (ICM) can also be conducted with non-IC specific management frameworks. In fact, she suggests that if an organization has, that is, a well-functioning quality management or process management system in place, it might be more efficient to extend this with some aspects of managing IC elements, rather than to attempt implementing a completely novel IC-specific management framework. In sum, it seems that IC can well be managed with traditional management models.

The impact of IC management on organizational competitiveness and performance

The key approaches to addressing the role of knowledge and its management in organizational performance are the resource-based view (RBV) of the firm (e.g., Penrose, 1959; Barney, 1991) and the knowledge-based view (KBV) of the firm (Kogut & Zander, 1992; Grant 1996a, b; Spender, 1996). Both of these begin from the core assumption that the competitiveness of the firm does not so much depend on its product–market positioning in relation to external competitors, as on its internal characteristics.

The RBV conceptualizes the firm as a unique bundle of idiosyncratic resources and capabilities (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984; Barney, 1986; Conner, 1991) and argues that organizations excel in competition to the extent that they govern certain types of resources. Resources are the stock of available factors that are owned or controlled by the firm, which are converted into final products or services (Amit & Schoemaker, 1993). Specifically, superior performance and, ultimately, competitive advantage result from possessing resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). It is widely agreed that nowadays the most important value generating resources are intangible in nature, that is, related to the skills and knowledge embedded in the organization. Resources create value in combinations, namely, they are bundled, and it is hard to discern the relevance of any one resource to the outcomes (Dierickx & Cool, 1989). According to this perspective, the major strategic management concern should be focused on identifying the key resources, maintaining them, and protecting them from competitor imitation (Rumelt, 1984; Wernerfelt, 1984; Reed & DeFilippi, 1990).

The KBV extends the RBV by explicitly considering knowledge as the most important resource and factor of production. According to the KBV, performance differences between organizations accrue because of their different stocks of knowledge and their differing capabilities in using and developing knowledge (e.g., Penrose, 1959;

Kogut & Zander, 1992; Spender & Grant, 1996; Grant, 1996a). From this perspective, the firm can be understood as a social community specializing in speed and efficiency in the creation and transfer of knowledge (Kogut & Zander, 1996, p. 503). Especially the collective and cumulative organizational knowledge, embedded in the forms of social and organizational practice, is considered to be of great strategic value (Spender, 1996; Bollinger & Smith, 2001), as it is tacit, socially complex, and specific and thereby difficult to imitate (Reed & DeFilippi, 1990). It is acknowledged that producing a good or a service typically requires the application of many types of knowledge, and therefore in addition to possessing knowledge resources that are valuable, rare, in-imitable and non-substitutable (Barney, 1991), the firm has to be able to manage, integrate, and coordinate different types of knowledge (Penrose, 1959; Kogut & Zander, 1992; Grant, 1996a, b; Grant & Baden-Fuller, 2004). Thus, one important focus of the KBV is how knowledge resources are utilized and coordinated in organizations, that is, the management of knowledge.

Taken together, the key assumptions of the RBV and KBV mean that the better the organization is able to manage its IC, that is, to identify its key intangibles and to account for these in its strategic planning and execution, the more likely it is to achieve high performance. Competitiveness and financial performance represent the two main aspects of organizational performance. It can be asserted that competitiveness in relation to competitors is demonstrated as high financial performance.

Thus, it can be hypothesized:

H1: *The more intensively an organization applies IC management practices, the more competitive it is likely to be.*

H2: *The more intensively an organization applies IC management practices, the higher revenues it is likely to generate.*

H3: *Faring well in relation to one's competitors leads to superior financial performance.*

This argumentation is graphically demonstrated in Figure 1.

Research methodology

Data collection and sample

In order to explore the above hypotheses, survey data in three countries – Finland, Russia, and China – was collected during February–April 2010. The research was guided by the following considerations in selecting these countries: First, most of the existing empirical papers on IC management practices and organizational outcomes are based on data collected from only one single country (Nickerson & Silverman, 1997; Lönnqvist *et al*, 2009), and thus it is not clear whether their findings apply in other economic and social contexts. Second, the above-mentioned studies are focused on developed countries, and, therefore, there is still very little knowledge about the impact of ICM in the developing and emerging economies. To bridge these gaps, the authors decided to choose three very different countries: Finland, China, and Russia. Finland has been heralded as one of the forerunners in building a sustainable knowledge-based economy and knowledge society, and has recently been either the first or at least in the top three of international competitiveness and educational comparisons. China and Russia are the biggest and growing emerging economies, and both have recently put innovation to the forefront of their national development strategies. Therefore, the efficient management of IC is an important priority in all three countries. By analyzing firms in three such different countries, it is possible to obtain a more generalizable picture of the impact of ICM on performance than the previous studies, which have only focused on a single country and/or developed countries.

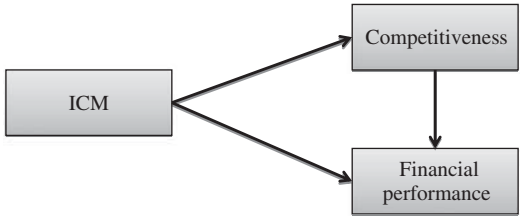

Figure 1 The research model.

For the purposes of obtaining better access to the data, as well as ensuring adequate translation of the survey instrument and its piloting, the research team was purposefully built to include native speakers of the languages of all three target countries.

In order to obtain reliable, diverse, and comparable data, it was decided to select companies with 30 or more employees that represent both production and service sectors and industries with different growth rates. Size limitation was imposed on the sample, with a consideration that small companies may not have systematic IC management practices.

The survey was run on a web-based survey software. Therefore, another criterion for selecting the companies into the research pool was added: the company should have a publicly available email address to which to send the link to the survey. The survey has been formulated in a way that any employee of the organization could answer it, in order to enlarge the potential sample. The administration of the survey proceeded in several stages and differed slightly among the three countries because of differences in the business culture and attitudes to surveys.

As a first step, the pools of companies that fit into the criteria described above were built based on publicly available databases. (Statistics Finland 2010 database for Finland and Ruslana database by Bureau van Dijk and SKRIN database by Russian National Association of Stock Market Participants for Russia were used for this purpose.) The size of the initial pool was 1264 for Finland and 10,000 in Russia. These pools differed in size as the

different response rate was expected across countries. In China, such a random pool was not used for the reasons described below.

Next, the invitation letters explaining the purpose and the procedure of the research and providing the link to the web-based questionnaire were emailed to the selected companies. The respondents were promised an executive summary report of the research findings as an incentive to complete the survey. In Finland, this was followed by two email reminders, sent one and two weeks after the initial mail. These resulted in 95 responses, or a 7.5% response rate. This response rate is lower than the 20–30% reported in some other Finnish studies (e.g., Kalmi *et al*, 2005; Pajunen, 2010). Still, it can be considered an adequate result, taking into account the significant length of the survey, absence of any informational support from any industry associations or other industry bodies, and the data collection strategy that (owing to resource limitations) excluded follow-up telephone contacts with the target companies (the latter are frequently used in Finland for survey data collection).

With Russia, acknowledging the typical reluctance in the corporate world to participate in any research because of the culture of information secrecy, it was decided to have a bigger target random pool of companies. The software that was used to administer this survey allowed tracking undelivered emails due to mistakes in the contact information or spam filters. It identified that out of 10,000 contacts selected from databases, only 4064 actually received the invitation email. This population yielded 145 visits on the survey page (3.6% of the population) and 21 responses (0.5% of the population or 14.5% of those who visited the survey webpage). Later, to enlarge the Russian sample, the invitation to participate in the survey was sent to the members of the alumni club of one of the Russian business schools. This effort yielded a 0.6% response rate. In addition, some respondents were also reached through the researchers' personal networks (with a 66% response rate). As a result of these efforts, 83 responses were collected. Evaluation of the received response rate is quite difficult because of a number of reasons. Survey studies among Russian companies are limited, and those available either do not report their response rates (e.g., Gurkov *et al*, 2012), or cover specific samples that possess a higher inclination to participate and follow a different data collection strategy that involves interviews (e.g., subsidiaries of foreign companies in Russia in Fey & Denison, 2003, with a 32% response rate; or R&D and innovative companies in Podmetina *et al*, 2009, a 17% response rate), or focus on convenience samples (e.g., students and faculty, as in Naumov & Puffer, 2000, a 83% response rate), and thus are not comparable with the random sampling used in this study. Therefore, taking into account the negative attitudes to surveys as the method of data collection in Russia, combined with the length of the survey in discussion, and the novelty of its subject area, the response rates obtained (very low through random sampling, and quite high through personal networks) are quite expected.

With China, similarly acknowledging the difficulty of 'cold call' research and the importance of personal networking (e.g., Boisot & Child, 1996, Michailova & Hutchings, 2006), it was decided not to use random database mailing. Data collection was supported by the Knowledge Management Centre of China (KMC), the biggest online KM community in China, which has about 1000 members from different industries and regions. In addition, some respondents were reached through the researchers' personal networks. As a result of these efforts, 83 respondents from China filled in this questionnaire. Taking into account the specifics of the data collection methods, the response rate from the online KM community can be approximated as 5%. The other studies in China that covered KM-related issues demonstrate higher response rates (e.g., Zhang & Begley, 2011, a 10% response rate including the subsidiaries of US companies; Chow & Gong, 2010, a 48% response rate). However, they focused mainly on R&D, innovative companies, and, thus, similarly to the case of Russia, can hardly be compared to the present study.

As a result of the data collection efforts, 261 responses were collected in the three countries. Further analyses excluded 26 responses as they were from companies with less than 30 employees or had failed to provide a response on the number of employees in the organization. Therefore, the usable sample consisted of 234 responses, quite evenly representing the three countries, with 90 Finnish (38.5%), 65 Russian (27.8%), and 79 Chinese responses (33.8%), each representing a different company.

The survey reached quite well the management level of the targeted organizations: in Finland and Russia over 65% of the respondents belonged to middle or top management, and in China 55%. The rest of the surveyed respondents, with minor exceptions, held specialist positions in their organizations. Even though the survey questions had been designed in a way that any employee of the organization could answer them, the high share of managerial responses makes the data collected even more insightful. The organizations in the sample represent over 20 industries, with the manufacturing sector somewhat dominating over services (57% versus 40%, with 3% being equally active in both sectors). The majority of the companies employ 50–500 employees (60–70% across the three countries). Around 70% of the companies in each of the three countries are domestically owned.

Taking into account the diversity of the sample that consists of the responses from the three very different countries, where different methods have been used to access the organizations in each country, it was necessary to check for potential differences among the sub-groups in the sample. The responses did not demonstrate a normal distribution, therefore the Kruskal-Wallis one-way test was applied to check if the dispersion of answers was homogenous. No major differences in responses

among the country sub-samples were found; thus the sample can be used as total for further analysis.

Measures

Intellectual capital management. Even though widely used scales for levels of IC elements exist, only a handful of studies have reported metrics for IC management practices (Kianto 2008; Kianto *et al*, 2010). Therefore, for the purposes of this research, the scale for ICM management was combined by the authors based on the literature (Zack, 1999; McKeen *et al*, 2005; Kianto 2011), constructing new items where needed. The developed scale aimed to measure whether the company understood knowledge as a strategic resource, was capable of establishing a clear link between its intellectual resources and its strategy, and had a clear strategic focus of its efforts in managing IC. The respondent was asked to indicate his/her agreement to a particular statement on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). The 6-point scale was chosen in order to avoid central tendency bias in responses.

Organizational performance. Measuring organizational performance is not a trivial task, with different approaches having both advantages and disadvantages (Richard *et al*, 2009). Taking into account the reluctance of Russian and Chinese organizations to share objective performance information, the study opted for perceived measures. Prior research has demonstrated that perceived measures of performance can be a reasonable substitute for objective measures (Dess & Robinson, 1984) and have a significant correlation with the objective measures of financial performance (Hansen & Wernerfelt, 1989).

Another issue considered was the incorporation of external (comparative) and internal views on performance. Therefore, it was decided to use two variables: competitiveness and financial performance. To measure *competitiveness*, the scale developed and validated by Deshpande *et al* (1993) and Drew (1997), and later used by Lee & Choi (2003) was applied. The original scale contains five items and aims to contrast the organization's market share, growth, profits, innovativeness, and overall success against its competitors (Cronbach's $\alpha = 0.8661$ in Lee & Choi, 2003). Similarly to ICM, a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree) was used.

The measure of financial performance was inspired by Singh *et al* (2006) and aimed to evaluate the trend of the main financial indicator of the company's performance, revenues, over the last years. A 5-point scale, with scale points being 'significantly decreased (more than 15%)', 'decreased (by less than 15%)', 'remained stable', 'increased (by less than 15%)' and 'significantly increased (above 15%)' was used. The percentage indicators of growth or decline were added in consideration that the perceptions of the growth/decline significance might differ across industries and companies. The rule of thumb in performance measurement suggests a 3–5-year time period for evaluating such trends. However, as the survey was launched in early 2010, a frame of three years or more would have included the times both before and after the world financial crisis of 2008 and thus might have included very different performance trends. Therefore, the authors decided to focus on the trend of indicators during and after the crisis (2008–2009).

The initial measures were built in English. In order to ensure that the respondents fully understand the questions and to raise the response rate by reaching non-English speaking respondents (Harzing, 2000), the survey items were translated into the respective languages of the countries in the sample. To secure measurement equivalence, the translation procedure followed several iterations, as recommended in the literature on cross-national research (Brislin, 1970; Singh, 1995): first, the measures were translated from English into Russian, Finnish, and Chinese by the members of the research team; second, the survey items in local languages were piloted with local business experts to ensure the most appropriate wording; next, reverse translation of the resulting items into English was performed by independent translators; finally, the resulting English versions were compared with the initial one and with each other, and local languages versions were adjusted as necessary.

Exploratory and confirmatory factor analyses were run to check for the reliability and validity of the used measurement scales (Hurley *et al*, 1997). During this analysis, several items from ICM and competitiveness scales were excluded, resulting in a five-item scale for ICM and a three-item scale for competitiveness. Table 1 presents the descriptive statistics for the resulting latent variables and Table 2 introduces the items representing the variables, factor loadings, internal consistencies, and validity indexes of the scales. In addition to Cronbach's α ($\geqslant 0.7$), composite validity (CR; $\geqslant 0.7$) and average variance extracted (AVE; $\geqslant 0.5$) indexes (Bagozzi & Yi, 1988) were computed. Table 2 demonstrates that the

Table 1 Descriptive statistics for model scales

#	*Latent variable*	*Mean*	*Standard deviation*	*Correlations*		
				1	*2*	*3*
1	Intellectual capital management	4.04	1.06	1		
2	Competitiveness	3.97	1.03	0.299***	1	
3	Financial performance	2.71	1.26	0.157*	0.258***	1

*** correlation is significant at 0.001 level (two-tailed).
* correlation is significant at 0.05 level (two-tailed).

Table 2 Reliability of measurement scales

Latent variables and scale items	*Factor loadings***	*Cronbach's α*	*CR*	*AVE*
Intellectual capital management		0.872	0.91	0.66
Our organization has a clear view of our current core knowledge (ICM1)	–[a]			
Our organization has a clear view of what knowledge and competences are the most relevant for the objectives (ICM2)	0.835			
Our organization's knowledge and competences are evaluated systematically (ICM3)	0.832			
Our organization benchmarks our strategic knowledge against that of our competitors (ICM4)	0.715			
Our organization explicitly recognizes knowledge as a key element in the strategic planning exercises (ICM5)	0.819			
Our organization has a clear strategy for developing knowledge and competences (ICM6)	0.853			
Competitiveness Compared to our key competitors, …		0.831	0.89	0.72
our organization is more successful (c1)	0.881			
our organization has a greater market share (c2)	–[a]			
our organization is growing faster (c3)	0.819			
our organization is more profitable (c4)	0.850			
our organization is more innovative (c5)	–[a]			

[a]these items were excluded from the scales based on the confirmatory factor analysis.
*** all factor loadings are significant at 0.001 level.

scales' parameters fall within the recommended limits. Therefore, the analysis suggests that the scales possess composite, convergent, and discriminant validity.

Confirmatory factor analysis of ICM and competitiveness scales yielded the following goodness of fit statistics: $\chi^2 = 20.228$ with $P = 0.381$ ($\geqslant 0.05$), $\chi^2/\mathrm{df} = 1.065$ ($\leqslant 3$), $\mathrm{GFI} = 0.980$ ($\geqslant 0.9$), $\mathrm{AGFI} = 0.961$ ($\geqslant 0.9$), $\mathrm{TLI} = 0.998$ ($\geqslant 0.95$), $\mathrm{CFI} = 0.998$ ($\geqslant 0.95$), $\mathrm{RMSEA} = 0.017$ ($\leqslant 0.05$) with $\mathrm{pclose} = 0.869$ ($\geqslant 0.05$). All of these indexes are within the most conservative limits recommended (provided in parentheses) and thus also confirm the validity of the scales.

Methods of analysis

As reported above, exploratory and confirmatory factor analyses were performed to check the scales' validity, using SPSS 20.0 and AMOS 20.0 software. In order to examine the impact of IC management practices on organizational performance, structural equation modeling (SEM) was used. The preference for SEM results from two considerations. First, the key measures in this study are latent variables with multiple indicators. Second, the research design implies multiple simultaneous dependencies among the model's variables. SEM appears to be an appropriate technique, as it allows simultaneously testing an integrated set of dependence links, distinguishing between direct and indirect effects, while accounting for the measurement errors of the multi-item constructs (Bentler, 1980; Anderson & Gerbing, 1988). To test the hypotheses, the maximum likelihood estimation procedure was used, often preferred in management and social science studies (Ping, 1996; Wooldridge, 2002; Zhou *et al*, 2005).

Findings

To test the hypotheses, Anderson & Gerbing's (1988) two-step approach was followed. The goal of the first stage, the measurement model, is to obtain an acceptable fit to the data (Bentler, 1980; Anderson & Gerbing, 1988). The goodness of fit statistics of the measurement model (presented in Table 3, column 3) fall within the most conservative limits recommended (see Table 3, column 2), suggesting that the model possesses high reliability and a close fit with the observed data.

In the second stage of SEM, the structural model was computed based on the measurement model found in the first stage. To achieve good model fit, the theoretical model did not require any further alterations; therefore it has similar goodness of fit parameters as compared to the measurement model (see column 3 of Table 3). Figure 2 illustrates the findings from the theoretical model. Standardized path coefficients are presented near the arrows, and squared multiple correlations are presented above the variable.

As Figure 2 demonstrates, ICM impacts on competitiveness positively and has no direct influence on performance, whereas competitiveness positively influences performance. Therefore, hypotheses H1 and H3 are confirmed, whereas H2 is rejected. Overall, the model explains 11.9% of the variance of competitiveness and 8.3% of the variance of financial performance.

Interestingly, the theoretical model shows that ICM has no direct impact on performance, whereas during preliminary data analysis a positive correlation between these two variables was identified (see Table 1). These results suggest that competitiveness mediates the relationship between ICM and performance. An alternative model that

Table 3 Goodness of fit statistics of different models of this study

1	*2*	*3*	*4*
Model parameters:	*Recommended (conservative) limits*	*Measurement model/ Theoretical model*	*Model 'ICM and performance'*
$\chi^2(P)$	($P \geqslant 0.05$)	25.993 ($P = 0.408$)	11.905 ($P = 0.219$)
χ^2/df	$\leqslant 3$	1.040	1.323
GFI	$\geqslant 0.9$	0.977	0.984
AGFI	$\geqslant 0.9$	0.959	0.964
TLI	$\geqslant 0.95$	0.998	0.991
CFI	$\geqslant 0.95$	0.999	0.995
RMSEA (P)	$\leqslant 0.05$ ($P \geqslant 0.05$)	0.013 ($P = 0.918$)	0.037 ($P = 0.60$)

includes ICM and performance only was tested (see column 4, Table 3 for goodness of fit statistics). It also demonstrates the positive impact of ICM on performance ($k = 0.163$ with $P = 0.019$), and explains only 2.7% of the variance of financial performance. Therefore, the findings from different models clearly indicate the existence of the mediation effect of competitiveness.

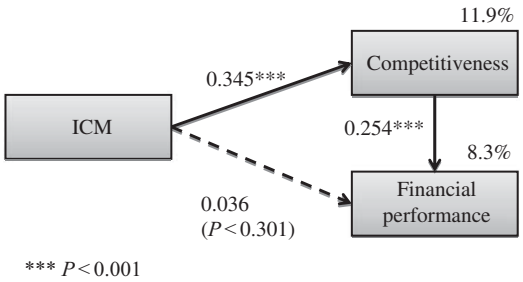

Figure 2 The structural equation model.

Discussion and conclusions

This paper addressed the impact of IC management practices on company performance. It found that the management of IC significantly impacts on performance in terms of competitiveness, as well as financial revenues. This indicates that the management of intangibles is a key managerial mechanism for firms in the knowledge economy.

IC management impacted on 12% of the variance in competitiveness, which can be considered quite significant, considering how many other issues have an effect on how a firm fares in comparison to its competitors. The impact of IC management on financial performance was fully mediated by competitiveness. The lack of a direct impact of IC management on financial performance could be explained by the cross-sectional nature of our data. Some earlier studies (Väisänen *et al*, 2007) have demonstrated that there is a time-lag in the impact of IC on performance.

Implications for theory and practice

This paper presented a pioneering work on empirically addressing the impact that the management of IC has on organizational performance with implications for both IC management theory and practice. As Kujansivu (2008) notes, the IC literature is packed with papers suggesting models for IC management, but it does not provide much evidence of companies actually having applied them. The lack of evidence on the extent to which IC management has been adopted in companies has even caused some observers to doubt the relevance of the IC 'school' for practicing managers. Even though very few previous studies have addressed the issue of to what extent IC is managed in firms, even fewer have examined how IC management might impact on the company bottom line. By demonstrating that IC management has a real impact on performance, this paper provides support for a wider diffusion of IC into managerial practice.

The implications for further research stem from a validated scale for measuring IC management presented in this paper. The developed scale was found to work in such different contexts as the knowledge-intensive and highly innovative Finland, and the emerging economies of Russia and China. The wide scope of application bears credence to the scale being usable in other contexts as well and thus paves the way for further research in this field.

Limitations and further research avenues

One of the interesting further questions refers to the comparison of the different IC management methods. Indeed, this study was based on the belief that to make IC a widely applicable tool for managerial purposes, its implementation should be made as easy as possible, and that it can be conducted without leaning on IC-specific frameworks (cf. Kujansivu, 2008). Accordingly, IC management was operationalized in this research project as the strategic planning and implementation activities related to the knowledge-based assets in the firm to examine IC management in general, rather than the application of some specific existing IC-specific frameworks and methods. What still remains an open issue is whether some of the IC-specific management methods (such as the IC Benchmarking System, Navigator, Intangible Assets Monitor) are more beneficial than others for facilitating high organizational performance.

Some future research avenues stem from the limitations of this study. One of the limitations is that only cross-sectional data was collected. As Väisänen *et al* (2007) have found a time-lag in the impact of IC on performance, IC management practices might be subject to the same trend. Therefore, the results might have demonstrated a stronger and direct impact between IC management and financial performance, had performance data been acquired at a later point in time. It also would have been preferable to obtain information on the financial performance from external objective sources. Therefore, further studies may consider using a longitudinal, panel approach and tracking, where possible, both subjective and objective performance measures.

Another limitation is linked to the cross-national nature of the sample and the sizes of country subsamples. The countries addressed in this research are quite different in their general management practices (e.g., Fey *et al*, 2004); so, it might be expected that IC management practices may have different impacts on financial performance. However, the number of observations from each country in the current dataset was not sufficient for testing the research model separately for each country. Significant differences in response distributions across the countries were not found, and thus the total sample was used for the analysis; however, this lack of differences might also be linked to the sizes of the sub-samples. Therefore, further tests of the proposed model with bigger country samples might yield interesting comparative results.

Finally, one more limitation refers to the chosen method of analysis. Even though SEM allows assessing a web of relationships and thus was very appropriate for this study, it also has some limitations (Brannick, 1995). With samples $\leqslant 250$ (as used in this study) it may overreject true models (Bentler & Yuan, 1999), leading the researchers to exclude some items from the model, as happened in this case. Therefore, a further examination of the proposed research model with full presented scales in a bigger sample may be important.

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