Journal of Intellectual Capital

The relational capital of the IT department: Measuring a key resource for creating strategic value

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Abstract

Purpose – The purpose of this paper is to shed light on how the relational capital of the information technology (IT) department creates value in organizations. In addition, the paper presents a multi-dimensional scale to measure and manage relational capital in the IT department.

Design/methodology/approach – In the first, explorative phase of the study, interviews and focus groups were conducted in order to develop a new measurement scale, which was subsequently tested through a survey questionnaire (212 respondents).

Findings – This research suggests that the relational capital of the IT department is a very important resource for the creation of strategic value. The statistical analysis conducted for this study confirmed the validity and reliability of the novel scale developed to measure this resource. Finally, thanks to factor analysis, five dimensions for the scale were identified.

Research limitations/implications – Data were collected in northern Italy only. Further studies are advisable to confirm the validity of the constructs and scale.

Practical implications – The questionnaire presented in this study can be used to monitor the effectiveness of the interactions between the IT department and the other key actors involved in IT-enabled innovation. The adoption of this scale and its possible adaptation to specific, evolving business contexts may enhance the practitioner's understanding of the role of relational capital in the value creation process.

Originality/value – The paper contributes to the "third stage" of intellectual capital research by concentrating on an intra-organizational level of analysis, which has been overlooked in the literature to date.

Keywords Social capital, Competitive advantage, Relationship capital

Paper type Research paper

1. Introduction

> After all, it is through ICT that we shape, re-shape and enable all of our processes. How should our IT people make sense of their job, then? I say: by continuously, constructively interacting with our specific business eco-system. Otherwise, why should not we just outsource the IT function? (General Manager from 2012 Focus Group).

Organizations often regard the efficiency of information technology (IT) infrastructure as the key, or even the sole, criterion to attach value to the IT department. As a consequence, many IT personnel see their main role as to keep the lights on and the costs low, while smoothly enabling the complete range of the organization's business processes (Peppard, 2010).

Journal of Intellectual Capital
Vol. 16 No. 4, 2015
pp. 835-859

1469-1930
DOI 10.1108/JIC-12-2014-0132

Many organizations tend to evaluate, reward or even outsource the IT function solely on the basis of its perceived efficiency. However, a number of practitioners and scholars are not satisfied with this evaluation criterion, arguing that it does not adequately explain the possible role of IT management in today's knowledge economy. Research into both management and information systems (IS) has fueled an in-depth debate (Liang *et al.*, 2010), resulting in the widely-accepted idea that IT can be leveraged to enhance not only organizational efficiency but also the creation of strategic value and competitive advantage (Kohli and Grover, 2008).

Specific conceptual and measurement tools are needed to reveal the extent to which any specific IT department is likely to contribute to strategic performance in the medium to long term. However, the research literature offers only limited support to meet this need. Existing studies tend to focus on the interpersonal skills, relationships and capabilities of the Chief Information Officer (CIO), who can be hired away by competitors at any time. The more persistent role of the IT department as a whole, a key actor in the organizational structure, has so far been overlooked by the literature.

This paper seeks to address this gap and to consider the role of the CIO as being embedded in a social structure that is made up of IT managers and other IT personnel. This research suggests that the relational capital of the IT department is a key resource, which may strongly influence the creation of competitive advantage and strategic value. The more this resource is structurally supported by the culture, processes and organizational embeddedness of the whole IT department, the more it can be safeguarded from possible turnover in the IT management team.

The concept of relational capital has evolved in the last few years. It was developed by members of the intellectual capital (IC) community, who were initially interested in the knowledge resources that could be derived from relationships with the firm's customers (Christopher, 1996); however, many scholars soon extended this construct to include the knowledge resources embedded in relationships with other external counterparts (Bontis, 2002).

The literature review reveals a substantial ambiguity in the operationalization of this construct. Management scholars have concentrated almost exclusively on two levels of analysis when investigating relationship-based resources: organizations, on the one hand, and individual managers or professionals, on the other. The relationship-based resources of individuals are usually measured against the well-established scales of social capital, such as the structure of social connections, the level of friendship, trust and commitment and the cognitive consonance of the relationship under study (Adler and Kwon, 2002; Nahapiet and Ghoshal, 1998). There is less consensus on the way that the relationship-based resources of organizations should be measured. Sometimes the scales of social capital are borrowed for this level of analysis; in other cases, social capital scales are complemented by further measures, more oriented to relational effectiveness and purposefulness for value creation, consistent with the theoretical foundations of IC research, which are strongly rooted in the resource-based view (RBV) of the firm. The intra-firm relational capital of organizational functions or departments has, however, been largely overlooked to date.

This is quite surprising, because the intra-firm level of analysis is very interesting. The literature has highlighted the importance of coordination between different divisions, areas and functions within the organization (Lawrence and Lorsch, 1967). Organizational functions tend to become increasingly specialized over time; there is a drift toward different and sometimes barely compatible languages, and even to the development of conflicting goals. The IT department is a typical example of such

phenomena: it is often perceived as a body on its own, with well-defined boundaries separating it from the rest of the organization (Gefen and Ridings, 2003). The typical workplace jargon, identifying the organization as the "internal customer" of the IT department, confirms that the IT department is a good example of an entity whose relational and coordination performances can be clearly distinguished in the context of a specific organization.

In addition to Lawrence and Lorsch's (1967) studies on organizational differentiation and integration, there are further reasons to focus on the relational network of the IT department. In particular, this study suggests that the growing importance of the relational capabilities of IT departments and IT managers is strongly linked to at least two vigorously growing trends: first, extensive IT outsourcing and cloud computing; and second, e-business.

Extensive IT outsourcing and cloud computing together challenge the traditional CIO role. IT managers must prove capable of managing both formal (e.g. service-level agreements) and informal (e.g. trust, cooperation) mechanisms for interaction management, both internally and externally (Goo *et al.*, 2009; Lacity *et al.*, 2011; Li and Tan, 2013). In the emerging cloud-computing era, the very concept of IT governance has changed, involving more and more inter-organizational issues (Peterson, 2004). Conversely, the e-business phenomenon implies that IT-enabled processes can span the whole value chain, from suppliers to partners, dealers, client companies and final consumers. Designing, redesigning and managing these processes is often possible only through long-term cooperative interactions, in which the active involvement of the IT department is likely to be essential for success (Liang *et al.*, 2010). According to this model, organizations involved in extensive IT outsourcing, cloud computing and/or e-business require the development of stronger relational capital on the part of their IT departments. As a result, the lack of tools to measure the relational capital of the IT department is an important gap, which needs to be addressed.

In the so-called third stage of IC (Dumay, 2013), the measurement of intangible resources is seen as a management process in itself. Decisions taken on what to measure, and how to measure, are viewed as the consequence of a preliminary struggle to understand the ongoing phenomena, and as a premise to further refine such understanding. For example, a paper by Montemari and Nielsen (2013) uses the ethnographic method to reconstruct the mental maps of a number of managers, identifying the processes through which value is created within a particular business ecosystem. The analysis allowed identifying the indicators for the intangibles that were perceived as crucial for value creation in that specific context.

In a similar way, this study is divided into two phases. In the first phase, based on interviews and focus groups (FGs), the authors explored how interviewees describe the role of the IT department in strategic value creation processes. Using systematic coding and analysis, the authors found that the possible strategic role of the IT department is almost always linked to important relational processes. Interview transcripts and data from FGs were used in order to map the main components of the relational capital of the IT department and its possible contribution to value creation, according to participants.

In the second phase of this research, the authors translated the results of the first phase into a Likert-scale questionnaire, which was tested and fine-tuned through a pilot and a main survey.

The main survey yielded completed questionnaires from 212 managers of firms in northern Italy. Thanks to EFA and CFA, five dimensions of the construct were identified,

corresponding to the intangible value of the relationships between the IT department and, respectively: (a) the top management team (TMT); (b) the Operations department; (c) the organization's suppliers (excluding IT suppliers); (d) the organization's customers; and (e) the IT suppliers. The analyses led to validate a final version of the scale, which included 12 items.

These items can be used to measure the purposefulness and effectiveness of the relationships under study for value creation. This scale complements traditional social capital scales, which commonly make use of psychometric measurements that are focussed on emotional and cognitive factors such as trust, personal bonds or cognitive consonance (Tsai and Ghoshal, 1998).

2. Background

Relationship-based resources have been investigated from the viewpoint of two main research traditions, i.e., intellectual and social capital studies, which have met and cross-fertilized since the late 1990s.

The literature on IC is rooted in the RBV approach and sees relational capital as a resource which should be exploited for value creation (Marzo, 2014). The literature on social capital, on the other hand, is rooted in social science and community studies, and its constructs aim to assess the emotional and cognitive features of the relationships under study. Social capital scholars focus on the social networks linking people at any level of analysis, such as a city, a community or a team (Nahapiet and Ghoshal, 1998); they are not necessarily interested in the contribution of social interactions to the financial performance of a firm.

Also the literature on the strategic value of IT management, mainly rooted in the IS research stream, has investigated the role of social relationships in shaping IT management success.

In the following paragraphs, the different definitions of relational capital stemming from the intellectual and social capital views are described; then, an overview of the role of IT managers' relationships according to the literature on IT management value is presented.

2.1 Relational capital in intellectual and social capital research

Relational capital was first identified as a dimension of IC in the early years of the century (Bontis, 2002). IC studies emerged in the 1990s, focussing on knowledge as a crucial intangible resource for value creation and competitive advantage. In the very first IC models, only two dimensions of IC were present, i.e., human and structural capital. Later, customer capital (Christopher, 1996) was included, soon to be embraced in the wider concept of relational capital. In today's standard IC model, human capital identifies the knowledge resources of individuals, whereas structural capital identifies the knowledge resources of the organization. Relational capital is a more dynamic concept, since it identifies the knowledge resources stemming from the web of relevant interactions which shape the organization.

It soon became clear to researchers that it is not easy to determine which relationships should be considered relevant to relational capital and which are the key indicators or criteria by which to evaluate the relationships under analysis. For example, should relationships with suppliers be included as a knowledge source? What about personal relationships between employees, and those between top managers? Is the frequency of interactions a sufficient indicator of the creation of relational capital within a certain relationship?

In order to address such issues, IC scholars often draw on the tradition of social capital. The concept of social capital stems from community studies after the 1960s, which revealed the paramount importance of social interactions by proving that people embedded in strong, warm and dense social networks are better protected against threats and are more able to grasp opportunities (Lin, 2001). These results encouraged management scholars to investigate the importance of social relationships in business settings. A seminal paper by Nahapiet and Ghoshal (1998) presented social capital as an antecedent of IC and competitive advantage. This paper also provided an analysis of the components of social capital that has become a standard guideline for operationalizing the construct. According to Nahapiet and Ghoshal (1998), social capital has three dimensions: structural, relational and cognitive. The structural dimension includes the overall pattern of the connections between the people under study; in other words, it describes who is linked to whom. The relational dimension includes friendship, trust, emotional bonds, obligations and expectations that characterize each relationship. The cognitive dimension includes shared values, interpretation and the languages used by different parties.

In summary, Nahapiet and Ghoshal's model of social capital made it possible to measure the relational embeddedness of an individual based on the structure of his or her social network, and the level of reciprocal trust and cognitive consonance within it. This model was originally conceived as a way to investigate intra-organizational personal relationships (Tsai and Ghoshal, 1998).

IC scholars have frequently adopted this model to measure relationship-based knowledge resources; however, the role that social capital plays within the IC framework varies significantly among different studies.

Three different strategies emerge from the literature of the last ten years. In the first strategy, which is the most widely adopted to date, the social capital model is adopted as the sole criterion to measure the relationship-based knowledge resources of the firm. In this case, the relational social capital is substantially a measure of trust, and can be understood as a dimension of social capital, along with structural and cognitive social capital. Examples of empirical papers adopting this approach include Sambasivan *et al.* (2011), Yim and Leem (2013) and Mura *et al.* (2014).

In the second strategy, the social capital variables are seen as part of a wider relational capital concept. The classical social capital dimensions (structural, relational and cognitive) are complemented by further measures, which aim to reveal the effectiveness of the relationships under study for value creation (e.g. Ghane and Akhavan, 2014).

In the third strategy, social and relational capital are seen as two distinct and complementary constructs. The former is considered appropriate to reveal personal and intra-organizational relationships, whereas the latter is considered suitable to reveal institutionally structured inter-organizational relationships. In addition, the indicators of social capital target interaction density, whereas those of relational capital target interaction purposefulness for value creation. This approach is proposed by Delgado-Verde *et al.* (2011).

In other words, the IC community has not yet reached a consensus on exactly what constitutes relational capital. In some cases, the label "relational social capital" indicates a dimension of social capital; in other cases, however, social capital is seen within the wider concept of relational capital. In yet other cases, relational and social capital are seen as two separate but complementary peer-level constructs, which define the entire spectrum of relationship-based knowledge resources. In this paper, the

authors adopt the latter approach. Relational capital is considered in this study as a clearly separate construct from social capital. In this way, social capital is considered as made up of psychometric measures of structural, relational and cognitive social capital; while relational capital is considered as a construct that aims to reveal the effectiveness and purposefulness of the relationship under study for value creation.

Although the social capital literature encourages (Payne *et al.*, 2011) different levels of analysis (e.g. cluster, firm, team, individual) and different loci of interaction activities (i.e. internal or external relationships), the IC community has so far mainly focussed on the firm as the sole level of analysis, and on one generic locus of activity at a time, whereas other approaches are at least as promising. For example, a paper by Mura *et al.* (2014) investigates the social capital of hospital wards rather than entire hospitals, showing how specific organizational units may, under certain conditions, allow more focussed and interesting analyses on the impact of social relationships.

2.2 Research literature on the strategic value of IT

The last decade has witnessed a heated academic debate on the contribution of IT to organizational performance (Liang *et al.*, 2010). Kohli and Grover (2008) concluded that: "the 'whether' of IT value research now lies in the past. Many recent studies demonstrate that our interlude with the productivity paradox was an artefact of time and measurement […] We have now accumulated a critical mass of studies that demonstrate a relationship between IT and some aspect of firm value" (p. 26).

But how, and under what conditions, does this relationship between IT and value creation unfold more effectively? There has been a growing consensus that a narrow focus on mere technological aspects is misleading because technology contributes to a firm's performance as part of an activity system that fosters the creation and appropriation of economic value (Piccoli and Ives, 2005). However, if IT contributes to economic performance as part of an activity system, then the role of IT management and IT personnel may become pivotal, and potentially more relevant, than other variables measuring IT assets, such as IT investment, infrastructure quality or software innovativeness. A growing stream of IT value studies has concentrated on IT management value, on how value is created not only through IT deployment, but, more specifically, through IT management (Melville *et al.*, 2004).

The authors examined the literature on IT management value and extracted a list of the key organizational capabilities that are impacted by the relational capabilities of IT managers, IT personnel and/or the IT department. Overall, the literature provides sound and interesting explanations for the importance of the relationship-based resources of the IT department, as synthesized in Table I.

The RBV is by far the most frequently adopted theory used to explain the importance of the relational capabilities of IT managers in the literature. As a result of coordination and extensive communication, IT personnel share a vision of the role of IT within the business: executives share the risk and accept responsibility for IT projects, whereas IS specialists are able to anticipate IT business needs and devise appropriate solutions (Feeny and Willcocks, 1998; Ross *et al.*, 1996; Barney *et al.*, 2001). As stated by Piccoli and Ives (2005) "Relationship assets are subject to asset stock accumulation […] the pillars of a friendly and trusting relationship between IT and the business can take years to develop. This development is built on past experiences and positive interactions" (p. 756). From the RBV standpoint, then, the IT manager's network of relationships creates resources and capabilities that are heterogeneous and mobile. These resources can then potentially create long-term competitive advantage.

Organizational capabilities supported by the relationship-based resources of IT managers, IT personnel and/or the IT department	Main sources
Effective management of IT outsourcing contracts/ service-levels agreements	Dos Santos (2003), Han *et al.* (2008), Lacity *et al.* (2011)
Effective strategic cooperation with the top management team (TMT)	Preston and Karahanna (2009), (Karahanna and Preston, 2013)
Effective IT strategic alignment/effective co-evolution between IT and business strategies	Benbya and McKelvey (2006), Chen *et al.* (2010), Lacity *et al.* (2011)
Effective operational cooperation between IT and business lines	(Bharadwaj *et al.*, 2007), Liang *et al.* (2010)
Effective management of IT-enabled change and innovation processes	(Banker *et al.*, 2006)
Effective management of IT user acceptance and collaboration	Ross *et al.* (1996)
Effective contribution to knowledge sharing and cooperation throughout the organization	Piccoli and Ives (2005)
Effective contribution to knowledge sharing and cooperation throughout the value chain	Klein and Rai (2009), Ray *et al.* (2009)

Table I.
Expected impact of IT relationship-based resources according to the literature

Strong encouragement to address this understudied issue comes from Kohli and Grover (2008): "The next generation of IT value studies should focus on the co-creation of value through IT rather than on IT value alone. Co-creation represents the idea that […] IT value is increasingly being created and realized through actions of multiple parties" (p. 28).

It is possible to conclude that there is consensus on the relevance of the relationship-based resources of IT managers, IT personnel and the IT department to the performance of the firm. But how, according to the literature, can such relationship-based resources be defined and measured?

The existing research literature provides few answers to this question. Kayworth and Witten (2010) mention the importance of social alignment mechanisms for successful information security strategies. Preston and Karahanna (2009) describe the collaboration between the CIO and the TMT in terms of shared understanding, whereas, in a later paper (Karahanna and Preston, 2013), they use classical social capital dimensions to investigate the same specific relationship. Cao and Zhang (2011) offer interesting criteria for measuring relational success in supply chains that include: information sharing, goal congruence, decision synchronization, incentive alignment, resource sharing, collaborative communication and joint knowledge creation. However, this list is not used to create a specific scale for measuring IT management capabilities.

Interestingly, Bhatt and Grover (2005) see the relationship infrastructure as a dimension of the IT capabilities construct, along with IT infrastructure and IT business experience. Their relationship infrastructure scale is developed on the basis of a single literature source, namely Ross *et al.* (1996). Unfortunately, the items of this scale have not been published, although the authors state that they measured the extent to which IT groups and line managers trust, appreciate, consult with, account for and respect each other in defining business and IT strategy. Although the paper only addresses the relationships between IT managers and business line managers, the findings are particularly interesting with regard to the goals of this paper. The authors found

that higher quality relationship infrastructures have a significant positive effect on the competitive advantage of the firm ($t = 2.82$, $p < 0.01$), whereas the other two dimensions of the IT capabilities construct had weak or positive effects that were not significant (IT infrastructure: $t = 0.20$, $p > 0.10$; IT business experience: $t = 1.66$, $p < 0.01$). This confirmed the idea that the relational capabilities of IT personnel deserve more attention.

It is interesting to note that this correlation has already been suggested in several theoretical papers (Mata *et al.*, 1995; Ross *et al.*, 1996), and confirmed both by qualitative studies (Chan, 2002; Wade and Hulland, 2004) and by at least one quantitative study (Bhatt and Grover, 2005; Li and Tan, 2013). However, these studies assessed only the quality of the relationships between IT managers and specific internal counterparts, such as business line managers or IT users. The resources stemming from other relationships in the IT department, such as those with IT suppliers or outsources, or those with partnering organizations throughout the value chain, were not taken into consideration. This is quite surprising, since many theoretical writings insist that in today's networked economy, the possible strategic role of IT goes far beyond the boundaries of a single firm (Kohli and Grover, 2008).

3. Research design

The relationship-based resources of the IT department have never been measured. Although the well-established scales of social capital (including measures of trust, engagement, personal bonds, cognitive consonance, etc.) could easily be adapted to this level of analysis, they have so far only been used to conduct studies on the role of the CIO, and have considered only one locus of interaction at a time (e.g. with the TMT only, or only with line managers). However, accurate relational capital scales that are focussed on the specific value creation purposefulness of the relationships, have never been developed for this level of analysis.

Starting from the scale of relational capital proposed by Delgado-Verde *et al.* (2011) for the firm level, the authors designed a research plan to adapt this scale to the IT department as a level of analysis.

This research process followed a four-stage process. In the first stage, the issue was explored, based on nine in-depth interviews with IT and non-IT managers. This allowed the authors to build a first version of the scale, including 30 items. In the second phase, two FGs were set up to discuss and improve the scale. This resulted in a 24-item scale, which was used as a pilot questionnaire. In the testing phase, the pilot and the main survey were conducted. Finally, reliability tests, factor analyses and some further discussions with key informants led to identify a final scale including 12 items, further divided into five dimensions.

More specifically, the authors rearranged the standard process presented by Bagozzi *et al.* (1991), and later elaborated by Turker (2009), to build and validate the scale. The general scale development process is presented in Figure 1. A description of the four phases of the scale design process (exploratory phase, conceptualization phase, testing phase and final phase) follows, together with their main outcomes.

4. Exploratory phase and scale conceptualization

The literature review led to a preliminary conceptualization of the importance of the IT department's relationship-based resources, suggesting that several key organizational capabilities can be impacted by the relational effectiveness of IT managers and personnel (Table I).

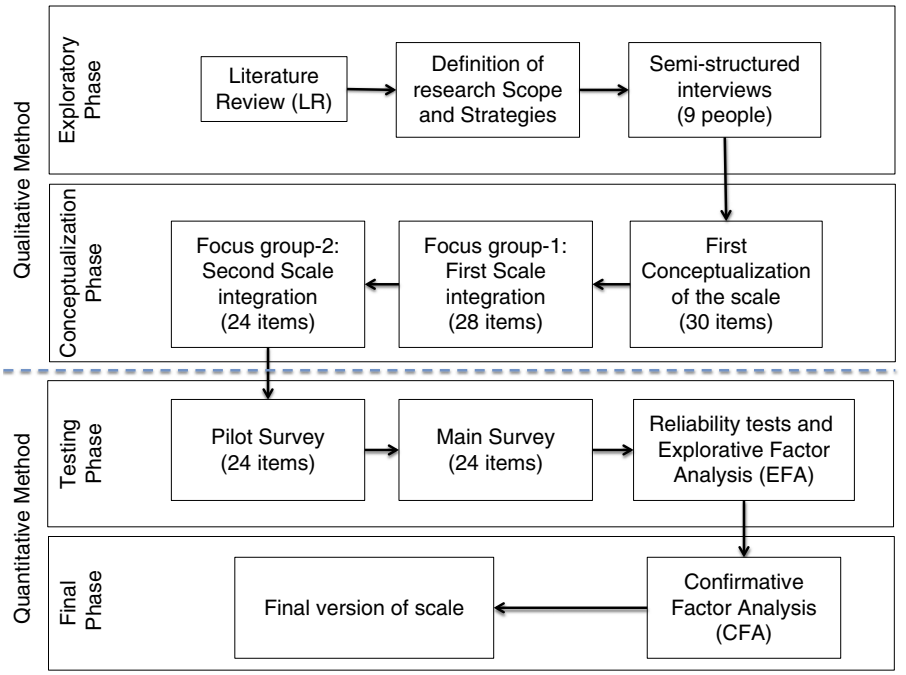

Figure 1.
Scale development process

A semi-structured interview guide was designed to explore practitioners' opinions on the role of the IT manager, and to assess which relational resources were perceived as important, and why.

Nine managers from nine different companies in northern Italy were interviewed. The interviewees were selected on the basis of the maximum variety criterion (Bryman and Bell, 2007), choosing both small and medium to large size enterprises, and both businesses and state-owned companies from five different industrial sectors (Appendix 1).

The interviews took place between February and May in 2013, and lasted between 50 minutes and two hours. They were all conducted by at least two researchers, one of whom asked questions, while the other took notes (Arksey and Knight, 1999). The conversation was driven by 12 open questions, which aimed to help interviewees expound the role and value of IT management in the interviewee's business setting. As is true of any explorative qualitative research, the information collection process included some flexibility to ensure that unforeseen phenomena could emerge during each interview. The interviews were recorded, transcribed and analyzed with Atlast.ti, using open coding, axial coding (Corbin and Strauss, 1990; Appendix 2) and memoing (Glaser, 1978).

All the interviews confirmed the importance of the intra- and inter-organizational embeddedness of the IT department. The analyses allowed to develop a list of eight relational areas, or loci of interaction, which the interviewees saw as being important, namely the relationships between the IT department and first, the TMT; second, the business lines and operational departments (or, more generally, those who produce goods/services and face the market); third, the internal IT users; fourth, the IT suppliers and outsourcers; fifth, the non-IT suppliers; sixth, the customers and/or

dealers of the firm; seventh, the other business partners and stakeholders of the organization; and eighth, other IT managers and professionals (IT managers' associations or clubs). A first version of the scale, which included 30 items, was obtained. There were four items for each relational area, except for area eight, which included two items only.

To create the items, both social capital and relational capital literatures were leveraged. With regard to social capital, the authors referred to the psychometric scales created Karahanna and Preston (2013), which used the three classical dimensions of social capital. Items were also adapted from Bhatt and Grover (2005), which measured reciprocal trust, appreciation, consultation and accountability within each relationship.

With regard to relational capital, the relational capital scale developed by Delgado-Verde *et al.* (2011) was adapted. This scale measures the extent to which each specific key relationship (e.g. with customers, suppliers, allies) is leveraged for, and effective in, pursuing the expected value creation goals (e.g. obtaining information, developing solutions).

The first draft of the scale was discussed in a FG1 (Figure 1). Managers from an important Italian CIO association and from an important top managers' association in Italy were invited. Four CIOs, two Chief Financial Officers (CFOs) and two Chief Executive Officers (CEOs) participated in this first FG. The discussion was extremely interesting. Participants agreed that those items, which had been drafted from the social capital tradition, focussing on psychometric emotional concepts such as trust, personal friendship or appreciation, could be misleading when evaluating the relationships of an IT department. They argued that it is important to measure not only how friendly or how trustful a relationship is, but also, or even mainly, how concretely effective it is. They argued that excessive friendship or trust, for example between the CIO and long-term IT suppliers, could result in counter-productive decisions and allow organizational slack or inertia. They strongly encouraged the authors to focus on the purposefulness of the relationships of IT management. The participants, in other words, seemed much more interested in the items inspired by the relational capital concept than by those inspired by the social capital concept.

The authors then decided to adapt this research according to the suggestions emerging from the practitioners. Instead of developing a comprehensive scale, including both social and relational capital items, the focus was on the development of a scale specifically dedicated to relational capital. This seemed much more rewarding, not only because of the arguments made by the participants and interviewees, but also because social capital scales were already well-established and quite easily adapted to the level of analysis of the IT department, whereas no specific relational capital scale yet existed for intra-organizational levels of analysis.

For all these reasons, the authors decided to partially rewrite the scale. A second FG was conducted (Figure 1), whose participants were the same as the first FG, with the addition of two CFOs, two CEOs and one Chief Operating Officer (COO). The scale was further discussed and fine-tuned on the basis of the relational effectiveness concept that had been developed in the previous FG. The final outcome was a 24-item scale, which is presented in Appendix 3.

All items were translated from Italian into English, and then translated back from English into Italian by another person to check the translation's accuracy, which was deemed satisfactory.

5. Testing: pilot survey, main survey, reliability, exploratory and confirmatory factor analyses

The scale described in Appendix 3 was used to conduct a pilot survey using a questionnaire. The questionnaire was submitted to ten managers from ten different organizations; the response rate was 100 percent since these managers had been personally selected and invited by the FG participants. The preliminary analysis of internal validity was encouraging (normalized Cronbach's α: 0.813, see Cortina, 1993). The questionnaire was therefore considered suitable for conducting a full survey.

During this research, both the group administration (Wood, 2003; Oppenheim, 2005) and the self-administration methods (Oppenheim, 2005) were used for data collection. The respondents consisted of 1,799 top managers from companies located in northern Italy. The authors decided to select respondents from members of at least two of the most important Italian CIO associations, members of a major Italian top managers' association and managers who were participating in conferences and meetings organized by one of the most important Italian business schools during 2012.

Respondents were invited by e-mail to complete the questionnaire, which had been made available online. Managers who were participating in initiatives from the business school were also given the opportunity to complete the questionnaire manually as printed versions of the questionnaire were available during conferences and meetings. Since the questionnaire included questions on possibly awkward relational problems, the respondents emphasized the need for anonymity. It was therefore not possible to group and compare the questionnaires where two or more managers from the same company had agreed to participate.

The questionnaire process began in July 2012 and was concluded in December 2012, when 245 questionnaires had been collected (77 manually, and 168 online). The response rate was 13.62 percent. Only completed questionnaires were considered for data analysis ($n = 212$, 86.53 percent of received questionnaires).

In this study, the respondents were top managers from businesses based in north-eastern Italy, which is one of the most industrialized areas in Europe. Almost all respondents were male (93.7 percent). Most respondents were middle-aged, with 37.3 percent between 45 and 54 years, and 33.5 percent between 55 and 64. The majority were expert managers who had been working in that role for more than three years (85.4 percent). The respondents comprised CIO/IT managers (29.1 percent), CEOs (14.6 percent), business line managers (10.1 percent), staff managers (9.5 percent), sales executives (8.2 percent), COOs (7 percent), CFOs (7 percent), product development managers (5.1 percent) and others (9.5 percent).

Respondents represented the following industrial sectors: manufacturing (50.6 percent), IT (12 percent), logistics (8.2 percent), utilities (7 percent), professional services (5.1 percent), large-scale retail trade (1.9 percent), health care (1.9 percent), energy (0.6 percent), public administration bodies (0.6 percent) and other (10.1 percent). Most respondents worked in medium-sized companies with 32.3 percent declaring a turnover of between five and 50 million euros per year, 27.2 percent between 50 and 200 million, 18.4 percent between 200 and 500 million, 6.3 percent between 500 and 1,000 million and 8.2 percent declaring more than a billion euros per year.

In order to assess reliability, two different methods were used. First, internal consistencies were assessed. The value of normalized Cronbach's α for the 24 items (Q28-Q51) was 0.906. The value of Cronbach's α for each of the 24 items was also examined to check whether the exclusion of any items could improve the overall α.

However, the data revealed only two items (Q33 and Q41) whose removal would have increased the value of α to just 0.907. Since the difference was not deemed relevant, all 24 items were retained.

The Bartlett test of sphericity was then used to examine the correlation of the variable through a χ^2-value, which was found to be 1,360.08 (degrees of freedom, df = 131), with excellent relevance ($\rho < 0.001$). This test also showed that explorative factor analysis (EFA) would be appropriate (D'Agostino and Russell, 2005). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1970, 1974) further confirmed this result. The KMO value in this case was 0.835. As Hutcheson and Sofroniou (1999) have stated, a value higher than 0.8 is commendable, which meant that EFA was an appropriate way to understand the structure of these variables (Thurstone, 1947) and to reduce the data set to a more manageable size (Field, 2009). As a result, an EFA (Rietveld and van Hout, 1993; Bandalos and Finney, 2010) was conducted. According to Hair *et al.* (2010) and Turker (2009), the item-to-total correlations should exceed 0.50 and the inter-item correlations should exceed 0.30.

The five factors captured 62.18 percent of the variance of the 24 items, which can be considered sufficient in terms of explained total variance. The value of 62.18 percent corresponded to the following values: cumulative initial eigenvalues, extraction sum of square (no rotation) and rotation sum of square. Factor 1 accounted for approximately 33 percent of the variance (eigenvalue 7.865), Factor 2 for 9.17 percent and so on. However, in the unrotated pattern matrix, there were ten cross-loading items with a value greater than 0.32 in two or more factors, which makes the matrix less clear. In order to identify the optimal number of factors, the SPSS v22.0 software was used. This process also identified the five solutions (McCrae *et al.*, 1996) automatically through Everett's (1983) model. In the second stage, a rotation of the pattern matrix (Varimax with Kaiser's normalization) was conducted. Table II shows that, after rotation, cross-loading items were reduced from eight to four items (Q35, Q41, Q43 and Q50, highlighted in gray).

In addition, no values in the factor correlation matrix exceeded 0.7. A correlation greater than 0.7 indicates a majority of shared variance (Campbell and Fiske, 1959).

Confirmatory factor analysis (CFA) is a popular statistical method for supporting construct validation processes (Di Stefano and Hess, 2005). CFA is used to address questions about the dimensionality of a hypothetical construct assessed by multiple indicators (John, 1990). All the factors found through EFA were tested, in order to test hypotheses regarding unmeasured sources of variability responsible for the commonality among a set of scores (Hoyle, 1991). Cudeck (2000, p. 281) has argued that "CFA contrasted with EFA, which addresses the same basic question but in an inductive, or discovery-oriented, mode." Although CFA can be used for testing hypotheses about the relations among a set of variables, it is best understood as an instance of the general structural equation model (Hoyle, 1995). Hence, CFA was conducted to obtain and verify the final version of the scale (Hair *et al.*, 2010), by using IBM's Amos software.

The five factors identified through the rotated pattern matrix (Table II) were utilized. The ambiguous values (Q35, Q41, Q43 and Q50) were excluded. According to Hair *et al.* (2010), the main value was calculated in order to test whether this model could fit. In particular, χ^2/df was 1.797; p-value was 0.006; CFI was 0.971; RMSEA was 0.061; and PCLOSE was 0.184 (Appendix 4). In Figure 2, the final version of the CFA is presented.

	Factor 1	2	3	4	5
Q28		0.631			
Q29		0.644			
Q30		0.736			
Q31		0.690			
Q32		0.585			
Q33		0.709			
Q34					0.541
Q35		0.393	0.341	0.440	
Q36			0.693		
Q37					0.652
Q38				0.796	
Q39				0.726	
Q40				0.637	
Q41		0.638	0.433		
Q42					0.838
Q43	0.568	0.323			
Q44			0.594		
Q45	0.712				
Q46	0.756				
Q47	0.831				
Q48	0.795				
Q49					0.745
Q50	0.535	0.410	0.390		
Q51			0.324		

Notes: Extraction method, principal axial factoring; rotation method, Varimax with Kaiser's normalization. [a]Rotation converged in seven iterations

Table II.
Pattern matrix[a] with Varimax rotation

6. Discussion of the results and elaboration of the final version of the scale

In order to build a final construct, the outcomes of the EFA described above were discussed with three managers who had participated in the FG2. This discussion assisted in building the final construct and in organizing it into appropriate dimensions. It was also possible to share the scale's final design with these managers.

These discussions aimed to examine the factors emerging from the statistical analysis, ascertaining if and how each factor could be considered a recognizable dimension of the "relational capital of the IT department" construct. Each dimension was considered in light of the relational capital approach in order to identify its meaning from a managerial point of view. Once participants agreed on a meaning, the factor received a label, identifying its role as a dimension of the higher level construct under study.

As previously shown, Factor 1 (Table III, and Figure 2) was clearly interpretable. After the exclusion of the cross-loading items Q43 and Q50, it included only those items measuring the extent to which IT management and/or the IT department has effective relationships with non-IT suppliers (suppliers who do not provide IT services). During the CFA, it was possible to notice that items Q47 and Q48 were strongly correlated and logically allied; as a result, Q47 was merged in Q48. Factor 1 was identified as a dimension of the "Relational capital of the IT department" construct, and was labeled as the "Effectiveness of relationships with non-IT Suppliers" (F1 in Figure 2).

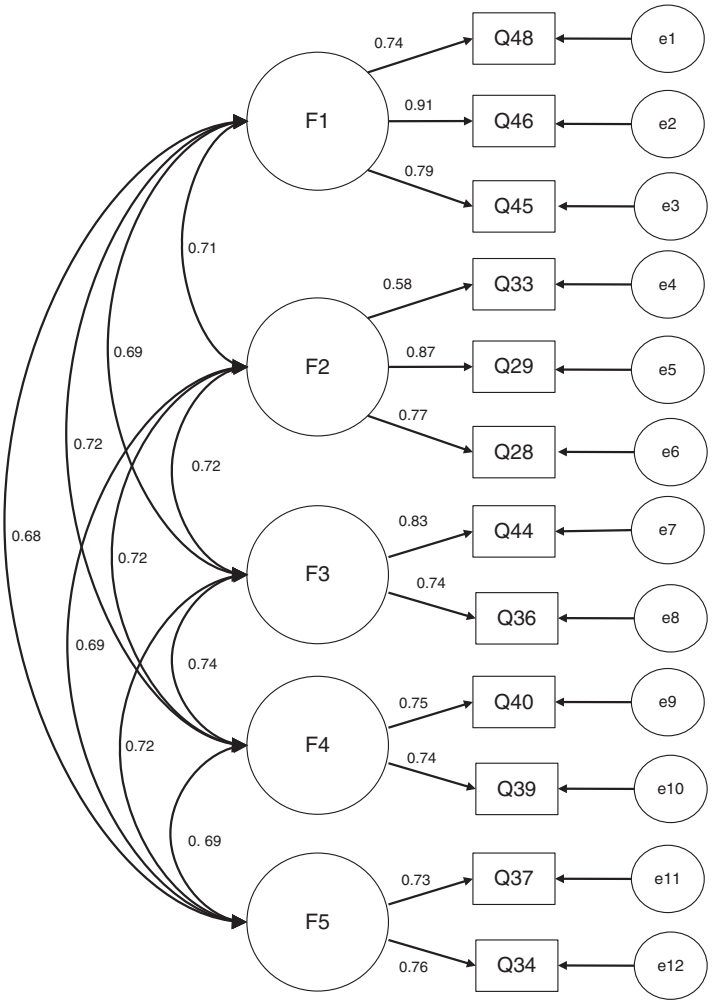

Figure 2.
Final output of CFA – standardized estimates

Note: The description of the corresponding dimensions and related items are listed in Table III

Factor 2 was also clearly interpretable. After the exclusion of the cross-loading items Q35, Q41, Q43 and Q50, it included only the items measuring the extent to which the IT department has effective relationships with the TMT. The CFA showed that items Q28, Q31 and Q32 were strongly correlated and logically allied, so the authors decided to merge them (in Q28). For the same reasons, Q29 and Q30 were merged (in Q29). In this way, Factor 2 was identified as a dimension of the relational capital of the IT department construct, and was labeled as the "Effectiveness of strategic relationships with the TMT" (F2 in Figure 2).

In addition, Factor 3 was clearly interpretable. After the exclusion of the cross-loading items (Q35, Q41, Q43 and Q50), it included all the items measuring the extent to which the IT department has effective relationships with the organization's clients and distributors.

Dimension code (Figure 2)	Dimension label	Item code (Figure 2)	Item text
F2	Effectiveness of strategic relationships with the TMT	e4[a]	The interactions between IT managers and IT vendors/outsources are jeopardized by the strong pressures for IT cost reduction in our organization
		e5	IT management's opinions about feasibility, costs, risks and opportunities are taken into consideration for strategic decision making in our organization
		e6	Frequent and in-depth interactions occur (e.g. through periodic meetings) between IT management and top management in our organization
F5	Effectiveness of relationships with internal operations departments	e11	The IT department interacts effectively with the business lines and/or with the Production departments in our organization (e.g. personnel in the business lines keep the IT management informed about emerging needs and specific market perspectives)
		e12	Sound audit processes are established to systematically assess IT user satisfaction and IT breakdown management in our organization
F1	Effectiveness of relationships with non-IT suppliers	e1	Our IT department interacts effectively with our organization's partners and/or stakeholders, for the development of specific projects and/or in order to share information, advice, complaints, etc.
		e2	Our IT department interacts effectively with our non-IT suppliers, for the development of specific projects
		e3	Our IT department interacts effectively with our non-IT suppliers in order to share information, advice, complaints, etc.
F3	Effectiveness of relationships with the organization's customers	e7	Our IT department interacts effectively with our organization's clients and/or dealers, for the development of specific projects
		e8	The IT department and those in charge of the core business (e.g. business line managers) actively cooperate for process/product innovation in our organization
F4	Effectiveness of relationships with IT suppliers and/or outsources	e9[a]	Sometimes I perceive the relationships with our IT suppliers as an oppressive accumulation of long-term constraints and established routines, hindering innovation
		e10	Taking care of the relationships with our IT suppliers is a priority for our IT management

Note: [a]Reverse item

Table III.
The final version of the five-dimensional scale for measuring the relational capital of the IT department

This factor also included item Q51, assessing the IT managers' participation in IT managers' associations or clubs. Through the CFA, it was clear that Q51 was noticeably weak as an indicator and it was accordingly deleted. Interestingly, this factor also included item Q36, assessing the IT managers' cooperative participation in product/service development. This result was consistent with the fact that effective participation in product/service development implies in-depth knowledge of the organization's market and good direct or indirect relationships with the customers. Factor 3 was identified as a dimension of the relational capital of the IT department construct, and was labeled as the "Effectiveness of relationships with the organizations' customers" (F3 in Figure 2).

After the exclusion of the cross-loading item Q35, Factor 4 included the two items assessing the IT manager's care for relationships with IT suppliers in terms of mutual respect and attention. Surprisingly, as a result of EFA, item Q38 was also included in this factor. This item describes complaint or conflict between the IT department and internal IT users. In order to clarify the final model, this item was removed, as its value was low using CFA. Factor 4 was defined as a dimension of the relational capital of the IT department construct, and was labeled as the "Effectiveness of relationships with IT suppliers/outsources" (F4 in Figure 2).

Finally, Factor 5 proved less easy to interpret. As a result of EFA, item Q49 was included in this factor. Item Q49 describes the cooperation between the CIO and other departments and/or with external partners in order to identify project risks. However, the CFA led to the exclusion of items Q42 and Q49 because their values were too low. After the exclusion of Q42 and Q49, the remaining items allowed a satisfactory understanding of their common features. Therefore, Factor 5 was identified as a dimension of the relational capital of the IT department construct, and was labeled as the "Effectiveness of relationships with Operations departments" (F5 in Figure 2).

The final scale composed of 12-item is presented in Table III. In this table, the factors were ordered logically, as follows: first, dimensions (a) and (b), focussing on the intra-organizational relationships of the IT department (corresponding to Factors 2 and 5, respectively); and second, dimensions (c), (d) and (e), focussing on the relationships with the business environment (corresponding to Factors 1, 3 and 4).

Therefore, this study identifies five dimensions for the construct "relational capital of the IT department," corresponding to the intangible value of the relationships between the IT department and two intra-organizational counterparts (the TMT and the operations department), as well as three inter-organizational counterparts (the organization's non-IT suppliers, the organization's customers and the IT suppliers). The literature corroborates the interviewees' opinion that all five dimensions of this construct are likely to be relevant to firm performance.

As for the first dimension presented in Table III, "effectiveness of strategic relationships with the TMT," the literature on strategic alignment asserts the crucial nature of top-down strategic planning and business-IT co-evolution (Chan, 2002; Preston and Karahanna, 2009); these elements are essential in designing and managing successful IS that meet firms' business needs. Through structured and effective relationships with CEOs and business executives, business and IT strategies become reciprocally understandable and adaptable.

As for the second dimension, "effectiveness of relationships with operations departments," the organizational cooperation view (Lawrence and Lorsch, 1967) suggests the importance of mutual understanding between IT professionals and those in charge of core processes. This relationship assists in avoiding detrimental conflicts and in solving operational problems satisfactorily for all involved.

In terms of the third dimension, "effectiveness of relationships with non-IT suppliers," the literature demonstrates that these relationships may also be relevant to performance. The collaborative exchange of information between the IT department and the firm's supplier may become strategic during supply chain integration projects and when key suppliers are involved in other IT-enabled innovation processes (Léger, 2010; Cao and Zhang, 2011; Sambasivan *et al.*, 2011).

Considering the fourth dimension, "effectiveness of relationships with the organization's customers," all knowledge-based theoretical approaches assert that key knowledge resources are embedded in customer relationships (Delgado-Verde *et al.*, 2011). Effective relationships with customers may provide the IT department with extremely valuable information, especially when launching e-business projects, new product development, new customer-centered innovative processes and business-to-business collaboration and integration projects (Tallon, 2011).

As for the fifth dimension, "effectiveness of relationships with IT suppliers/ outsources," the literature increasingly highlights the importance of the firm's IT providers. In this kind of effective business partnership, IT suppliers and outsourcers can provide important contributions to innovation and increase competitive advantage (Smaltz *et al.*, 2006), all while allowing the successful adoption of popular and legitimated best-practice software solutions (such as the leading ERPs).

On the basis of these considerations, the final scale resulting from this study (Table III) allows the evaluation of a whole range of relationships of the IT department, that are key to value creation.

7. Conclusions

There is growing awareness that IT can be a key resource in creating value; on the other hand, it is also increasingly clear that IT cannot create value in isolation, because competitive advantage can result only from the process quality and inimitability through which IT-supported innovation is selected, fine-tuned and adapted to specific business contexts.

Therefore, the IT department has a pivotal role to play in value creation for organizations. Effective, collaborative, purposeful relationships between the IT department and the intra- and inter-organizational business context are likely to be very important for both strategic and operational management. Nevertheless, these relationships remain surprisingly under-investigated, and prior to this study, no quantitative scale had been developed to measure their effectiveness.

This work explores how the IT department creates value not only through the technical competences of IT personnel, but also, and at least as importantly, through its relational capital. It creates value in this way by developing effective relationships both at the intra- and inter-organizational level. On the basis of the findings from the explorative phase of this research, the authors built and tested a questionnaire aimed at assessing the relational capital of IT departments.

Due to the strong interest raised by the project, it was possible to rely on the active collaboration of several managers in developing the questionnaire and in conducting both a pilot and main survey. This collaboration led to a final version of the measurement scale, which is more flexible and better focussed than the original scale. The final version of the scale includes 12 items, selected and grouped after a thorough discussion of the EFA and CFA results.

This scale allows identification of five dimensions for the construct "relational capital of the IT department," respectively measuring the effectiveness of the relationships

between the IT department and (a) the TMT, (b) the operations departments, (c) the organization's non-IT suppliers, (d) the organization's customers and (e) the IT suppliers. This novel scale complements the traditional indicators of relational capital, which are often derived from social capital literature, by focussing on the role of purposeful interaction in value creation.

The present work has a number of limitations that offer opportunities for future research. First, data were collected only in northern Italy. Although this business context may be somewhat representative of industrialized countries in the west, further studies are recommended in order to increase the generalizability of these findings. Second, the scale developed in this paper has not yet been adopted in practice. Future research opportunities include interventionist-type case studies exploring how the adoption of this scale impacts IT management value at specific firms (e.g. as a tool to evaluate IT managers). Third, the authors recommend both qualitative and quantitative longitudinal studies to better understand and test the correlations between each dimension of the scale and organizational performance.

Despite these limitations, this study makes a useful contribution to the academic literature. The outcomes of this research shed light on hidden aspects of intangible resources while contributing to a more granular understanding of how a key organizational function, such as the IT department, can effectively participate in strategic value creation processes. Therefore, the authors hope that the scale they have developed will contribute to both the intellectual and social capital research streams. Further, the scholarly community can now use this new questionnaire to investigate the antecedents and outcomes of the relational capital of IT departments, thus also contributing to studies on the strategic value of IT management.

The measurement tool proposed by this study may also prove useful in practice. The managers involved in the FG all insisted on the educational value of a direct data collection process, such as that based on the questionnaire proposed here. They also noted its possible impact on organizations' shared beliefs regarding the role of the IT department in today's knowledge economy. If adopted by practitioners for monitoring purposes, the scale proposed by this study also represents an opportunity to develop a new organizational culture, more aware of the importance of intangible resources both at the intra- and inter-organizational levels.

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Appendix 1

Table AI. Data on the nine explorative interviews

Companies	Industry	Company size	Role of respondent
Company 1	Utilities	270 employees	Chief Financial Officer (CFO)
Company 2	IT	40 employees	Chief Information Officer (CIO)
Company 3	IT	600 employees	Chief Executive Officer (CEO)
Company 4	Manufacturing	1,000 employees	Chief Information Officer
Company 5	Manufacturing	1,610 employees	Chief Marketing Officer (CMO)
Company 6	IT	510 employees	Chief Information Officer
Company 7	Health care	4,200 employees	Chief Information Officer
Company 8	Manufacturing	50 employees	Chief Operations Officer (COO)
Company 9	Insurance	650 employees	Chief Information Officer

Appendix 2

Axial code	Description	Code frequency	Number of interviewees
Competitive strategy support	IT manager supports business strategy effectively. In addition, IT manager has a positive effect on business performance, generating value	32	9
Involvement in strategic decision making	IT manager is actively involved in strategic decision making. This positively affects IT to generate new value	21	7
Innovation	IT manager promotes and disseminates innovation in the organization	19	9
Relationships with IT suppliers	IT manager is effective in managing relationships and contracts with IT vendors	19	6
IT manager and product/service development	IT manager collaborates with R&D to develop new products or services	15	8
Increasing efficiency	IT manager contributes to rationalize and reduce costs	22	8
Developing relationships with other managers	IT manager cooperates with other managers of other business areas (or departments)	24	6
Relationships with the organization's customers/dealers	IT manager manages the inter-organizational relationships of the supply chain (or external network)	12	5
Reliable infrastructure	IT manager ensures an information infrastructure that can be integrated and is reliable, standardized and scalable	27	6
Relationships with other business partners and stakeholders of the organization	IT manager is likely to address the needs of users and stakeholders	18	7
Customer loyalty	IT manager is involved in the customer loyalty management processes	8	4
IT manager's position in the organizational chart	IT manager reports directly to the CEO/ General Manager	6	7
Corporate image/reputation	IT manager contributes to the improvement of the corporate image/ reputation	6	6
Software customization	IT manager is always able to customize software to meet user needs	6	4

Table AII. Axial codes from the interview

Appendix 3

Code	Item
Q28	Frequent and in-depth interactions occur (e.g. through periodic meetings) between IT management and top management in our organization
Q29	IT management's opinions about feasibility, costs, risks and opportunities are taken into consideration for strategic decision making in our organization
Q30[a]	Our IT management is often not informed about the strategic resolutions being made by the board or by the TMT
Q31	The top IT manager and her/his chief (e.g. the CEO or CFO) are perceived as a strong team, from which the majority of successful innovations in our organization stem
Q32	In the case of important innovation projects, our IT management actively cooperates with the TMT, from the beginning, to help define the project's general strategies
Q33[a]	The interactions between IT managers and IT vendors/outsources are jeopardized by strong pressures for IT cost reduction in our organization
Q34	The IT management interacts very effectively with the business lines and/or with the production departments in our organization (e.g. personnel from the business lines keep IT management informed about emerging needs and specific market perspectives)
Q35[a]	IT managers and those in charge of the core business (e.g. business line managers) often do not understand each other in our organization; it is as if they speak two different languages (e.g. an IT and a business language, etc.)
Q36	The IT department and those in charge of the core business (e.g. business line managers) actively cooperate for process/product innovation in our organization
Q37	Sound audit processes are established to systematically assess IT user satisfaction and IT breakdown management in our organization
Q38[a]	Sometimes there is a climate of reciprocal complaint or conflict between the IT department and internal IT users in our organization
Q39[a]	Sometimes I perceive relationships with our IT suppliers as an oppressive accumulation of long-term constraints and established routines, hindering innovation
Q40	Taking care of the relationships with our IT suppliers is a priority for our IT management
Q41[a]	IT suppliers often present their innovation proposals directly to internal users and to other managers, without involving IT management
Q42	IT supplier cooperation has been crucial for the success of an important innovation project in our organization
Q43	Our IT management interacts effectively with our organization's clients and/or dealers in order to share information, advice, complaints, etc.
Q44	Our IT department interacts effectively with our organization's clients and/or dealers, for the development of specific projects
Q45	Our IT department interacts effectively with our non-IT suppliers in order to share information, advice, complaints, etc.
Q46	Our IT department interacts effectively with our non-IT suppliers for the development of specific projects
Q47	Our IT management interacts effectively with our organization's business partners and/or stakeholders, in order to share information, advice, complaints, etc.
Q48	Our IT department interacts effectively with our organization's partners and/or stakeholders, for the development of specific projects
Q49	When critical or strategic innovation projects begin, our IT department cooperates effectively with other departments and/or with external partners in order to identify risks of project failure and manage them
Q50	Our IT management makes important contributions to the identification of new business opportunities
Q51	Our IT managers participate in category networks (e.g. CIO club or professional IT associations) that allow them to share experiences and best practices

Note: [a]Reverse item

Table AIII.
Item list after conceptualization phase – Likert scale (0 = strongly disagree, 5 = strongly agree)

Appendix 4

Factor	CR	AVE	MSV	ASV
F1	0.86	0.672	0.514	0.486
F2	0.79	0.565	0.524	0.505
F3	0.76	0.614	0.551	0.519
F4	0.72	0.560	0.551	0.517
F5	0.72	0.557	0.527	0.486

Notes: CR > 0.7; AVE > 0.5; AVE > MSV; AVE > ASV
Source: Hair *et al.* (2010)

Table AIV.
CFA reliability and validity

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