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**Proceedings of the  
5th European Conference on  
Intellectual Capital  
VOLUME ONE**

**University of the Basque Country,  
Bilbao, Spain  
11-12 April 2013**



**Edited by  
Lidia Garcia, Arturo Rodriguez-Castellanos  
and Jon Barrutia-Guenaga  
University of the Basque Country**

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# The Influence of Relational Capital on Product Innovation Performance at Innovative SMEs

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**Abstract:** The authors build on the intellectual capital and new product development perspectives to study the influence of relational capital on product innovation performance. An empirical research was conducted, using a questionnaire administered to Portuguese innovative SMEs. The results suggest that relational capital does have a positive effect on product innovation performance. In particular, "Vertical relationships" stands out as the main relational capital element significantly affecting product innovation at the innovative SMEs level. The existence and proactive management of relationships with customers and suppliers emerge as critical factors to product innovation success. We find our results to be useful for both researchers and practitioners: at the intellectual capital level, we contribute to the ongoing understanding of relational capital's impact on critical business activities; at the product innovation level, we contribute to the identification of additional critical success factors for new product development. At a time when intellectual capital and product innovation management are both considered to be critical for companies to gain a competitive edge (and even survive) in today's unstable business environment, this study contributes to acknowledge the relevance of relational capital management on product innovation success at innovative SMEs.

**Keywords:** intellectual capital, relational capital, product innovation, new product development, innovative SMEs, Portugal

## 1. Introduction

Academic research on business competitiveness has for the past decades gradually changed its focus. The development of dynamic capabilities sustained in factors that are tacit, invisible or intangible by nature has arisen as a privileged mean to achieve greater resource efficiency and create competitive barriers. At the same time, innovation has materialised as one of the most crucial factors for structural development. Against this backdrop, the general purpose of this research is to study interaction effects between intangible assets and innovation at the firm level. Specifically, we will analyse the influence of relational capital on product innovation performance at innovative small and medium enterprises (SMEs).

It is nowadays generally accepted that the main components of intellectual capital can be structured into three dimensions: human capital, structural capital and relational capital (Curado et al. 2011). The relational capital concept is based on the consideration that companies are not isolated systems. On the contrary, they are actively and permanently connected to multiple external entities. All valuable relationships of this kind, with customers, suppliers and other relevant stakeholders, represent relational capital (Roos et al. 2001). Bontis (1998) argues that the knowledge of marketing channels and customer relationships is the main theme of relational capital. It represents the potential an organization has due to external intangibles, including the knowledge embedded in customers, suppliers, the government or related industry associations. According to Bueno and Salmador (2000), relational capital represents the firm's "competitive and social intelligence". For the purpose of this study, we will thus define relational capital as all valuable relationships, channels and networks that exist between an organization and its stakeholders.

Innovation, in the broadest sense, is in the heart of economic change. The vision of innovation as the main driver of long term development is today widely accepted (Leiponen 2005). At the firm level, innovation is nowadays considered to be inevitable: driven by a variety of forces (including globalization, technological evolution and demography), the economic environment is changing rapidly. To succeed in such a context, or even to remain viable, corporations must respond with innovation (Govindarajan and Trimble 2005). Product

innovation, due to its higher visibility in the relationship between companies and consumers, stands out as an element of particular importance to any business. Companies must develop new products, at least on occasion, to maintain or gain competitive advantages, and their ability to create new products has been linked to performance and even long-term survival (De Jong and Vermeuler 2006, and Linzalone 2008).

Several studies have succeeded in trying to empirically demonstrate that intangible assets in general are positively and significantly associated with the firms' innovative capabilities (for example Canibañó et al. 2002; Chen et al. 2004; Del Canto and González 1999; European Commission 2006; Linzalone 2008; Santos Rodrigues et al. 2010; Subramanian and Youndt 2005; Wu et al. 2008). Nevertheless, rarely were those researches specifically oriented at assessing the impact of relational capital on product innovation performance. Similarly, several authors from the product innovation field (e.g. Abetti 2000; Bullinger et al. 2004; Cooper et al. 2004, 2004a, 2004b; Kandemir et al. 2006; Montoya-Weiss and Calantone 1994; Shum and Lin 2007) have analysed the critical success factors for new product development (NPD), but they seldom focused on the specific impact of relational capital elements. In order to fill these gaps, the main purpose of this study is to empirically validate if the existence of relational capital elements at innovative SMEs influences its product innovation performance.

## **2. Relational capital and product innovation: Theoretical model**

Product innovation is by definition an uncertain process, with few repetitive or predictable elements. Consequently, it requires a search for knowledge outside the firm's existing knowledge base, often in areas unrelated with its current operations. This is why relational capital, or the intensity with which the organization is connected with elements outside its walls, can be a critical source of innovation.

Hargadon and Sutton (1997) studied how the development of network connections across industries can benefit product innovation. Continuous innovation, they argue, is often related to occupying a "structural hole", that is, the gap in the flow of information between subgroups in a larger network. In fact, knowledge is often shared imperfectly through time, people, organizations and industries. The ideas that come up in a group could solve other groups' problems, but that can only happen if there are links that can go through the existing frontiers between solutions and problems. When those connections take place, existing ideas can appear new and creative, as they change shape and are combined with other ideas to solve new problems. We thus argue that high levels of relational capital at the firm level (through a clear orientation to develop links with external knowledge sources) strengthen the firm's ability to absorb and transform new knowledge, and thus its product innovation potential. In fact, some authors (eg. Cohen and Levinthal 1990) state that the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends (that is, the firm's "absorptive capacity") represents a learning process that is critical to its innovative capabilities.

Empirical support was also found for the notion that developing and nurturing the existence of knowledge flows beyond the borders of the firm and through distinct scientific areas turns R&D efforts more productive (Pike et al. 2005). This kind of initiatives includes cooperation agreements with suppliers, external experts, research centres or universities, as well as contacts with regulatory entities. Nonaka and Takeuchi (1995) argue that the creation of an R&D network based on strong connections with suppliers was determinant for the success of Japanese firms' innovation efforts in the 80's.

Other studies (for example, Ahuja 2000) tried to understand the impact of collaboration networks on the firm's innovative capabilities. It was found that direct and indirect ties with other firms and institutions do have an influence on the firm's innovation output. In fact, the existence of collaboration networks was found to contribute to the sharing of knowledge, know-how and physical resources, serving as "conductors" through which the news of technological breakthroughs, new solutions to existing problems or failed approaches travel from one firm to another. Bullinger et al. (2004) also argue that the existence of vertical and horizontal networks (with customers and suppliers and with other firms) is a very important factor to the firm's ability to innovate. Firms "need to build up a company-wide internal innovation network of innovation actors and integrate their innovation process in mutual horizontal and vertical networks" (Bullinger et al. 2004, pp. 3346) in order to share knowledge and benefit from complementary competencies, as a critical way to timely identify new innovation options and directions. Subramanian and Youndt (2005) conclude that external relationships, alliances and collaboration networks are essential to an organization's innovation versatility, adding that "social capital" is gaining increasing importance and visibility as an organizational resource.



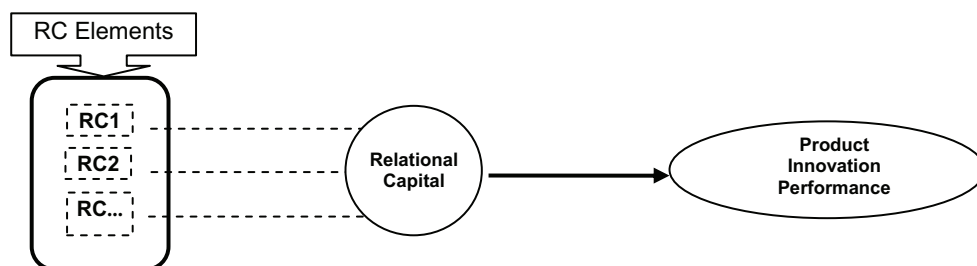
Some studies stress the importance of relational capital as a manifestation of the organization's market orientation. Bontis (1999) mentions the relevance of an organization-wide generation of "market intelligence" regarding current and future needs of customers, especially through vertical relationships. This pragmatic perspective of relational capital stresses the importance of developing multiple external links as a way to increase the firm's ability to identify the true needs of the market, and thus increase the potential success of its new products.

We thus find some evidence that relational capital, representing the set of channels, contacts and initiatives that build bridges between the firm and its external environment, can be a critical source of new knowledge that feeds the firm's innovative capabilities. Therefore, it seems acceptable to assume that the existence and proactive management of relationships with external stakeholders will have a relevant influence on the firm's product innovation efforts at innovative SMEs. These relationships increase access to new ideas and contribute to a better understanding of the target markets, increasing the odds of success at launching new products.

We will thus hypothesise that *relational capital is positively associated with product innovation performance at innovative SMEs*.

Even if one accepts this hypothesis in a general way, another important question remains: which of the constitutive elements of relational capital are the main drivers of product innovation? Within the notion of collaborative networks lies a wide array of possibilities, namely regarding the decision to establish relationships with very different types of stakeholders. Understanding which are more relevant to product innovation at innovative SMEs is particularly critical, more so if we accept the notion that collaborative networks are harder to establish and manage at the SME level. To help identify the specific relational capital elements that improve product innovation performance is another purpose of this article.

Figure 1 encapsulates the theoretical model we intend to test:



**Figure 1:** Theoretical model

### **3. Research methodology**

In order to empirically gauge the influence of relational capital on product innovation performance at innovative SMEs, and having presented the theoretical background that inspired this study, we will now focus on the research methodology that guided our field work.

#### **3.1 Variable definition and measurement**

Being a volatile and uncertain process, product innovation often requires a search for knowledge outside the firm's existing knowledge base, frequently in areas not directly related to its current activities. That is why relational capital, or the intensity with which the firm relates with external entities, can be an essential basis to acquire new knowledge. It thus seems adequate to assume that the existence of direct and indirect links with external stakeholders will have a determinant impact on the firm's innovative capabilities, and particularly on its product innovation performance. Firms with stronger ties to its suppliers and customers also gain an increased sensitivity towards market needs, which turns their product innovation effort into a more oriented and effective process. In order to study the existence of relationships with the exterior, and also to understand to what extent they are proactively managed at the firm level, we chose to consider two relational capital elements: the existence of vertical and horizontal relationships; and the management of relationship processes (incorporating the results of our own research and also studies from Ahuja 2000; Bullinger et al. 2004; IADE 2003; Pike et al. 2005; Subramanian and Youndt 2005, and Youndt et al. 2004):

- *Vertical and horizontal relationships* surveyed the existence of relationships with customers, suppliers, competitors and other institutions with the specific goal of enriching the firm's product innovation capabilities. We relied on three indicators to measure this element:
- *There are vertical relationships (with customers and suppliers) with the specific goal of strengthening our product innovation capabilities*
- *There are horizontal relationships (with partners and competitors) with the specific goal of strengthening our product innovation capabilities*
- *There are relationships with other institutions (government agencies, external experts, public and private R&D centres, shareholders, etc.) with the specific goal of strengthening our product innovation capabilities*
- *Management of relationship processes* relates to the proactive and systematic management of existing relationship processes and channels with the exterior. We relied on five indicators to measure this element:
- *The company makes a specific effort to identify and establish relationships with customers or users who are more receptive to innovative products (lead users)*
- *The company actively manages formalized relationship processes with clients*
- *The company actively manages formalized relationship processes with suppliers*
- *The company actively manages formalized relationship processes with competitors*
- *The company actively manages formalized relationship processes with institutions, shareholders and investors*

In what concerns the measurement of product innovation performance, a growing number of studies is relying on the use of the so-called "impact indicators", which measure the financial and economic significance of product innovation to the company. With that in mind, we relied on three indicators to measure product innovation performance, incorporating the results of our own research and also studies from Cooper (2004), OECD (2005), Shum and Lin (2007) and Souitaris (2002):

- Proportion of projects entering development stage that became commercial successes (met or exceeded sales goals) in the past three years;
- Percentage of current sales revenue derived from new products introduced in the past three years;
- Proportion of projects hitting their launch dates on time and on budget.

### **3.2 Sample definition and data collection**

As in most studies concerning intellectual capital and product innovation, this research was conducted at the firm level. The theoretical population was established as "small and medium Portuguese innovative firms". We chose a network of Portuguese innovative SMEs, COTEC's "Rede PME Inovação", as being the best possible sample for our theoretical population. COTEC is a non-profit association supported by the Portuguese Government and the institutions of the National Innovation System, aimed at promoting the competitiveness of companies established in Portugal, through the development and the diffusion of a culture and practice of innovation. COTEC's membership list includes virtually all of the most prominent companies operating in Portugal. Among its initiatives, COTEC endorses an expanding innovative SMEs network ("Rede PME Inovação") based in Portugal, which comprises innovative SMEs that, having applied for network membership, fulfil a set of specific criteria and enjoy a minimal score on COTEC's "innovation scoring". At the date of the research, this network comprised 100 firms, with a total of around 7729 employees and 782 million Euros of total turnover.

Once the research constructs were operationalised and the target population and its sample were established, a preliminary version of the questionnaire was designed. A 5-point Likert scale was used in relational capital related indicators (comprising a total of eight statements), and a choice of percentage intervals was used in product innovation performance items (three in total). A pilot study with four firms and an expert interview were conducted, and some items were refined through this purification process. The data collection took place from July 2008 to January 2009, via e-mail, involving all 100 companies. The request included a description of the study, stating its usefulness and social value, and a statement of confidentiality. The questionnaire was directed to the CEO of each firm, as suggested by the Oslo Manual (OECD 2005). Follow-up telephone calls

were made to each firm explaining the purpose of the research, and a few questionnaires were taken in person. 72 responses were received, for a response rate of 72 percent. As every response was valid, 72 was our effective sample size.

#### 4. Data analysis and results

This section is dedicated to the empirical findings of the research. Once all questionnaires were received, we proceeded to the treatment and analysis of the data, using a combination of multivariate statistical techniques.

##### 4.1 Preliminary analysis

A preliminary analysis of the data for processing and purification purposes was conducted, using SPSS software. The existence of abnormal behaviour was studied through the analysis of frequency tables and descriptive statistic measures, as well as through a joint purification by classifying the data into clusters, using k-averages. As a consequence, two cases were considered to be incoherent, and were therefore excluded. A chi-square test proved the geographical representativeness of the sample. Cronbach's  $\alpha$  coefficients of the constructs were then calculated. Cronbach's  $\alpha$  coefficient for "relational capital" was 0.770, and Cronbach's  $\alpha$  coefficient for "product innovation performance" was 0.746. Typically, the minimum threshold of Cronbach's  $\alpha$  coefficient is 0.7 (Hair et al. 1998).

##### 4.2 Regression analysis and results

The next step of the study was to empirically test the relationships between relational capital and product innovation performance. We started by reducing the data, using a principal components factor analysis. In what concerns relational capital, KMO's measure of sampling adequacy was 0.696, signalling an acceptable quality of correlation between variables. Bartlett's test resulted in a 0.000 level of significance, dismissing the hypothesis that the correlation matrix is the identity matrix. These results allowed us to proceed with factor analysis for relational capital. Two factors were extracted under the established criteria, as presented in Table 1, obtained through a Varimax rotation with Kaiser normalization that converged in three iterations. These factors account for 59,476 percent of cumulative variance explained. All item loadings are over 0.5, which is commonly considered as a high significance level.

**Table 1:** Factor analysis results for relational capital

Factor	Percentage	Item description	Loadings
Factor 1: Vertical relationships		The company actively manages formalised relationship processes with clients	,893
		The company makes a specific effort to identify and establish relationships with customers or users who are more receptive to innovative products (lead users)	,794
		There are vertical relationships (with customers and suppliers) with the specific goal of strengthening our product innovation capabilities	,673
Variance explained	39,575	The company actively manages formalised relationship processes with suppliers	,624
Cumulative variance explained	39,575		
Factor 2: Horizontal and institutional relationships		The company actively manages formalised relationship processes with institutions, shareholders and investors	,807
		There are relationships with other institutions with the specific goal of strengthening our product innovation capabilities	,786
		There are horizontal relationships (with partners and competitors) with the specific goal of strengthening our product innovation capabilities	,706
Variance explained	19,901	The company actively manages formalised relationship processes with competitors	,604
Cumulative variance explained	59,476		

According to the characteristics of the items, we labelled these two factors as follows:

- Factor 1: "vertical relationships", representing the existence and proactive management of vertical relationships (with customers and suppliers), aimed at improving the firm's product innovation capability;

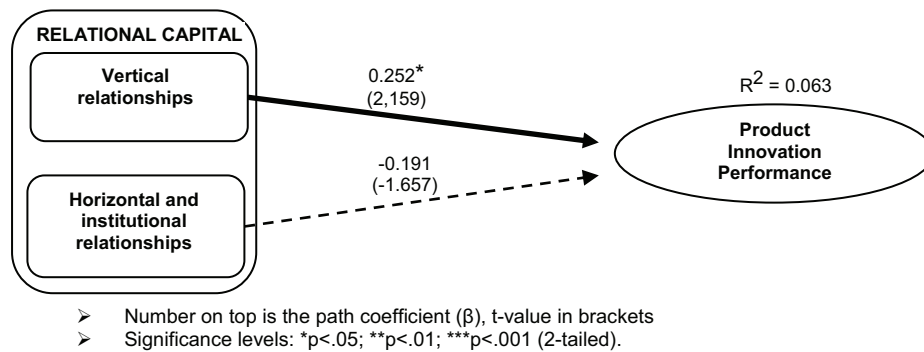
- Factor 2: “Horizontal and institutional relationships”, representing the existence and proactive management of horizontal relationships (with partners and competitors, as well as with shareholders, investors and other institutions), aimed at improving the firm’s product innovation capability.

In what concerns product innovation performance, KMO’s measure of sampling adequacy was 0.653, signalling a reasonable quality of correlation between variables. Bartlett’s test resulted in a 0.000 level of significance, dismissing the hypothesis that the correlation matrix is the identity matrix. These results allowed us to proceed with factor analysis for product innovation performance. One single factor was extracted under the established criteria, as presented in Table 2, which accounts for 66,657 percent of cumulative variance explained. Therefore, we aggregated the three items into one single measure for product innovation performance. Again, all item loadings are over 0.5.

**Table 2:** Factor analysis results for product innovation performance

Factor	Percentage	Item description	Loadings
Factor 1: Product Innovation Performance		Proportion of projects entering development stage that become commercial successes (meet or exceed sales goals) in the past three years	,871
		Proportion of projects hitting their launch dates on time and on budget	,811
Variance explained Cumulative variance explained	66,657 66,657	Percentage of current sales revenue derived from new products introduced in the past three years	,764

We proceeded by performing a multiple linear regression on the data resulting from our factor analysis. The results are contained on Figure 2.



**Figure 2:** Regression analysis

The results confirm that relational capital does have a positive influence on product innovation performance, but strong differences in significance levels show that not all relational capital elements we considered have such a relevant effect. In fact, only the element we called “vertical relationships” reveals a significant impact on product innovation performance.

## 5. Discussion, limitations and directions for future research

The objective of this study was to analyse the influence of relational capital on product innovation at innovative SMEs. We conducted a linear regression analysis between constructs to test our assumption, which was validated by the results: relational capital showed a positive and significant impact on product innovation performance. However, only one of the elements that comprise it revealed such an impact. That element was identified as “vertical relationships”, representing the existence and proactive management of vertical relationships (with customers and suppliers) aimed at improving the firm’s product innovation capabilities. Other types of relationships the firm establishes and manages with the exterior, namely with partners and competitors, shareholders, investors and other institutions, did not show a significant effect on product innovation performance at the companies we analysed. Looking at the overall responses to the questionnaire, we verify that horizontal and institutional relationships reveal much lower mean scores than vertical relationships, indicating that it is clearly more common to create and cultivate links with clients and suppliers than with other stakeholders.

These results are consistent with some fragmented research findings published recently in similar contexts (e. g. Bontis 1998; Cabrita and Bontis 2008; Chen et al. 2004), and allow us to generally conclude that the better

the innovative SMEs manage and nurture their relational capital, the more successful those firm's product innovation efforts will be. The specific relevance of "vertical relationships" that was detected is consistent with the interpretation of relational capital as a manifestation of the firms' "market orientation". In fact, an effective way to gather important knowledge regarding current and future market needs is through the establishment of relationships with clients and suppliers. By doing this, firms are able to more easily obtain, absorb and internalise market knowledge and to manage their product development process in a more oriented and effective manner. This idea is reinforced by some authors from the product innovation research stream (for example Cooper et al. 2002 and Kotler 1991), who stress the importance of creating strong ties with clients and suppliers to enhance the firm's ability to identify market needs and thus increase its product innovation effectiveness. Our research shows that these findings also seem to apply to innovative SMEs.

We hope this study contributes to clarify which relational capital elements are the most important to product innovation success, offering some clues on how to address the problem of managing relational capital to increase product innovation performance. Creating and managing relationships with customers and suppliers seem to be key factors to consider.

This research has some limitations that need to be addressed. The first one relates to the characteristics and size of the population being studied, COTEC's "Rede PME Inovação". We cannot state without reservations that these firms are representative of all Portuguese innovative SMEs, so the generalization of our results must be cautious. Conducting further research within a larger population would be useful to confirm the generalization of our results to all innovative SMEs.

Another important issue to consider regards the decision to analyse the influence of only one intellectual capital component on product innovation. Some studies (for example, Bontis 1998; Bontis et al. 2000; Cabrita and Bontis 2008; Chen et al. 2004; Santos Rodrigues et al. 2010) have found that intellectual capital components often reveal relevant path dependencies among themselves, when measuring their combined influence on organizational phenomena. Low  $R^2$  readings on our model suggest the convenience to rebuild it by incorporating other intellectual capital components (namely structural capital and human capital). In the future we will study the combined impact of all dimensions of intellectual capital on product innovation performance.

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