INNOVATIVENESS AND NETWORK COMPETENCE: AN INTEGRATION AND EMPIRICAL EXAMINATION

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ABSTRACT

This paper reports a study of the interdependence of network competence and innovativeness in a product innovation context. Based on a systematic review on innovation literature, authors define two review constructs for innovativeness and network competence. The dimensions of both concepts were validated through a sample of 164 manufacturing Portuguese firms, which provides interesting results concerning the behavior of Portuguese manufacturing companies at the level of network innovation.

INTRODUCTION

During last years, higher attention was been given to innovation as a mean to create and maintain competitive advantages. It is being even considered as an important component of entrepreneurship and a key element in business success (Johannessen et al, 2001). However, in practice, the development and introduction of a new product involve considerable risk and consume firm's resources and time effort. In order to remain competitive, firms are looking for ways to increase its capacity and commitment to innovation.

Globalization and the use of information technologies had helped induced cooperation among various types of organizations (Rycroft and Kash, 2004). As cooperation is recognize as a valuable mean for integrating complementary resources into the organization, it reveals opportunities to firms to establish innovation partnerships. Depending on a firm's innovation targets, different types of partners are needed to support innovation activities (Gemunden et al, 1996). Nevertheless, being part of a technical partnerships network doesn't implies, by itself, real success in the innovation process. The ability to survive in their networks will ultimately determine a firm's performance (Ritter et al, 2002) and therefore it is necessary to acknowledge the network competence of a firm.

We are concerned with the study of the concepts of innovativeness and network competence. More specifically we intend to identify its components and to empirically examine its integration. This paper is organized as follows. First, we present a review of innovativeness and network competence literature and we define constructs for both concepts. Then we present our methodology and sample issues. This is followed by our investigation results organized in three parts: (1) network innovation behavior of manufacturing Portuguese firms, (2) scale reliability analysis and (3) factor analysis of proposed constructs. The paper concludes with a discussion of implications and future research.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

In this globalization era a firm needs to be innovative in order to survive and to be profitable. Research on the innovation topic involved a multidisciplinary effort whose major field of research had been the identification of innovative firms, and what define and distinguish it from a non innovative. The firm categorization depends on the definition of innovativeness adopted by researchers (Salavou, 2004; Subramanian, 1996).

One body of research assumes that the innovative firms are those that adopt innovations (Subramanian, 1996). This emphasis on technological innovation is also found on Hsieh and Tsai work's (in press) that sustain that the technological knowledge and know-how possessed by a firm defines its technological capability - the driving force of a firm's innovation.

Calantone et al (2002) conceptualized firm innovativeness from two perspectives: the rate of adoptions of innovations by the firm and the organization's willingness to change. At their work firm innovativeness and innovation capability are the same.

Hurley and Hult (1998) distinguished organizational innovativeness from the concept of firm's capacity to innovate. Organizational innovativeness is the firm opening to new ideas (cultural) and its distinct from innovation capacity - the firm ability in adapt or implement new ideas, processes or products with success.

This distinction between innovativeness and innovation capacity is a recurrent topic of discussion among academics. Concerning a later Hult et al work (Hurley et al, 2004), Woodside (2005) identified a muddling of definitions when is stated that "innovativeness relates to the firm's capacity to engage in innovation; that is, the introduction of new processes, products, or ideas in the organization" (Hult et al, 2004, p.429). The authors' response (Hurley et al, 2005) acknowledged that the former formulation of Hurley and Hult (1998) was the one that more closely resembles their understanding.

Regardless this discussion, innovativeness and innovation capacity are mixed in literature and frequently used as synonymous. Tuominen et al stated in their study that "innovativeness refers to an organization's capacity to innovate – to create and adopt innovations and implement them successfully" (Tuominen et al, 2004, p.497).

Desphandé and Farley (2004) (see also Deshpandé et al, 1993) measured innovativeness as the firm behavior concerning the introduction of a new product or service into market (being fist to market, avoiding late entry and stable markets, and being in the cutting edge of technology).

This behavioral perspective is also present in Szeto's definition of innovation capacity: "a continuous improvement of the overall capability of firms to generate innovation for developing new products to meet market needs" (Szeto, 2000, p.150).

Hadjimanolis (2000) defined innovativeness as the firm's performance in technological innovation (new product number, new product novelty and new markets) and realized that it was affected by the resources and capabilities of firm's.

This resource-based perspective was presented in Avlonitis et al (1994) who developed an integrated concept of organizational innovativeness. Defined as a latent capacity of the firm, innovativeness is composed by two critical parts - technological and behavior, which denote the capacity and the commitment of the firm to innovate (Avlonitis et al, 1994). Their multidimensional concept included technological innovation challenges, manifested strategic innovation intentions, innovativeness of core machinery, innovative leadership and product innovativeness. The work of Nassimbeni (2001) also measured firms' capacity to innovate with a multidimensional construct: product innovation, process innovation, amount of investment on innovation, human resource management, and inter-organizational relationships.

Common to those two conceptualizations is the inclusion of a dimension for product innovativeness - the newness level of the new product. Lawton and Parasuraman (1980) measured the product newness by the degree of change effort required to user and the degree of product novelty. Booz-Allen & Hamilton (1982) (in Cooper, 2001) measured the degree of innovation of the product according to two axes: the company and the market. Most of the classifications found in the literature have been based on their new product classification (see for example Fritz, 1989; Cooper, 1994; Atuahene-Gima and Evangelista, 2000; Lukas and Ferrell, 2000; Sandvik and Sandvik, 2003). Atuahene-Gima (1996) defined product newness into two dimensions integrating the behavioral change required by users and the degree of novelty to the market. Zirger (1997) used a categorization based in technical change: incremental or radical.

In our conceptualization of innovativeness we considered two dimensions. The technological dimension represents the technological resources of the firm and is measured by its technological challenges and future investments. The behavioral dimension highlights the firm commitment to innovation through its innovation culture and its product innovativeness. The proposed innovativeness construct is a latent capacity of firms and is schematically illustrated in *Figure 1* below:

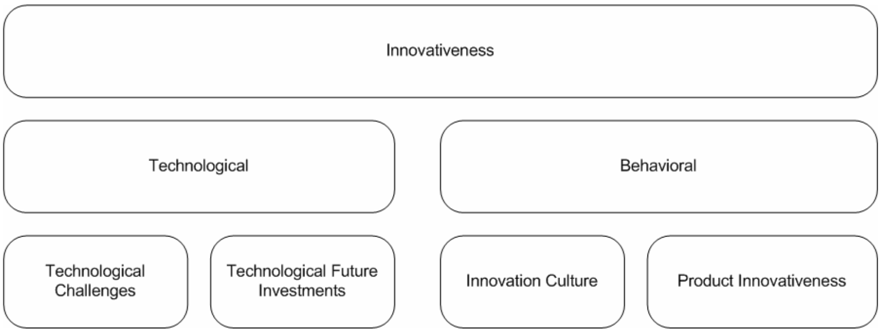


Figure 1: Concept of innovativeness

In practice, the development and introduction of a new product involve considerable risk and consume firm's resources and time effort. In order to remain competitive, many firms are looking for ways to increase its capacity and commitment to innovation. The use of information technologies allow firms to gain access to different partners, not geographically restricted.

Depending on a firm's innovation targets, different types of partners are needed to support innovation activities Suppliers, buyers, consultants, universities, among many others, are potential innovative partners with specific kinds of resources and know-how. The entire set of collaborative activities established then becomes a network.

Nevertheless, being part of a technical partnerships network doesn't implies, by itself, real successes in the development of new products or process. The IMP Group research on theory and methodology of relationship networks (see for instance Ford, 2002) concluded that firms should not be seen in isolation, but as being connected in business systems. As a result firms are subject to the control and influence of others within and around the relationship, and the business networks are self-organizing systems (Ritter et al, 2004). All collaborations differ in importance and intensity, and firms build up and maintain only those relationships which are valuable to them (Gemunden et al, 1996).

The ability to survive in their networks will ultimately determine a firm's performance (Ritter et al, 2002) and therefore it is necessary to acknowledge the network competence of a firm. Gemunden and Ritter (1997) consider knowledge as a prerequisite to be in the network. They introduce the competence concept in network as "the resources and the activities of a focal company to generate, develop and manage networks in order to take advantage of single relationships and the network as a whole" (Gemunden and Ritter, 1997, p.297). This specific characteristic of each company was later formally stated: "company's degree of network competence is defined as the degree of network management task execution and the degree of network management qualification possessed by the people handling a company's relationships" (Ritter, 1999, p. 471) (see also Ritter and Gemunden, 2003).

Looking specifically into the innovation capabilities in SMEs, Branzei and Vertinsky (2006) considered the concept of acquisition capabilities based on innovative firms that actively scan external sources of knowledge, seek diverse partnerships and learn. This external idea sourcing may prove particularly critical in situations where relevant skills tend to be dispensed among highly specialized players.

In our conceptualization of innovation network competence we considered two dimensions. The management dimension represents the general network competence of the firm and is measured by its management tasks and qualifications. The commitment dimension represents the firm capacity of acquisition into an innovation network and considers the technical support and market and institutional sources for new product development (NPD). In our problem perception of innovation network, this capability can be used to complement the concept of network competence. The proposed construct is a latent capacity of firms and is schematically illustrated in *Figure 2* below:

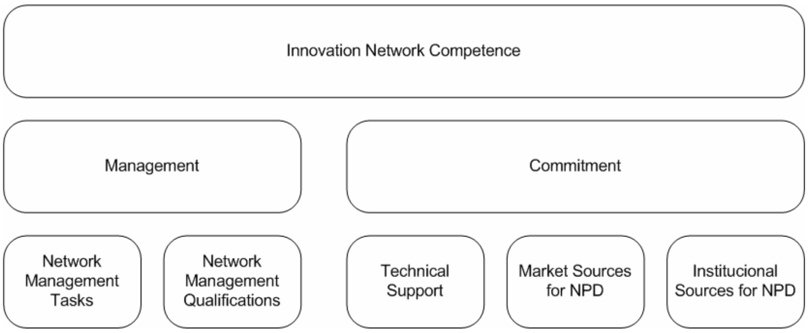


Figure 2: Concept of innovation network competence

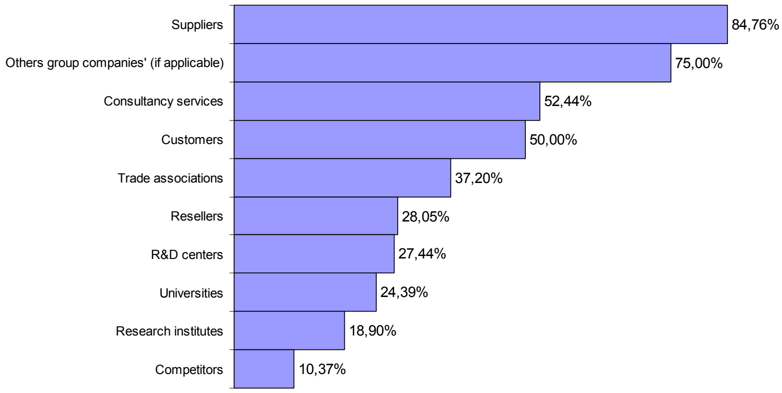
METHODOLOGY AND SAMPLE

Data to the present study was obtained through a mail questionnaire as part of a wider study of the Portuguese industry strategic behavior in a product innovation context. Sample was randomly executed by the Portuguese Statistics National Institute (INE) on its company directory and was stratified by industrial activity and dimension. From the total of 170 responses received, we excluded six responses because of excessive missing data. The 164 usable responses represent an effective response rate of 9%. The length of the questionnaire (40 questions) was the main reasons presented by non-respondents to justify non-participation. Our respondents were CEO (50%) or top managers (30%), male (77%), with an average of 40 years old and 15 years of industry experience. Our sample consists mainly of small firms (49%) and medium-sized firms (37%). The participants' firms had been established for 27 years (average).

RESULTS

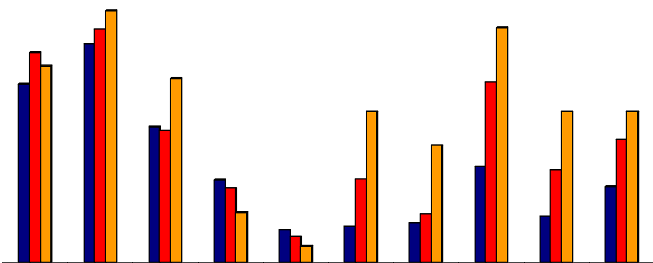
Portuguese manufacturing companies

In order to understand the network innovation behavior of Portuguese manufacturing companies, we asked respondents to indicate if their firms received any technical support from twelve different types of technical partner during the 2002-2004 period (Yes/No-1/0). Results are illustrated in *Graphic 1*, below.



Graphic 1: Technical support (2002-2004).

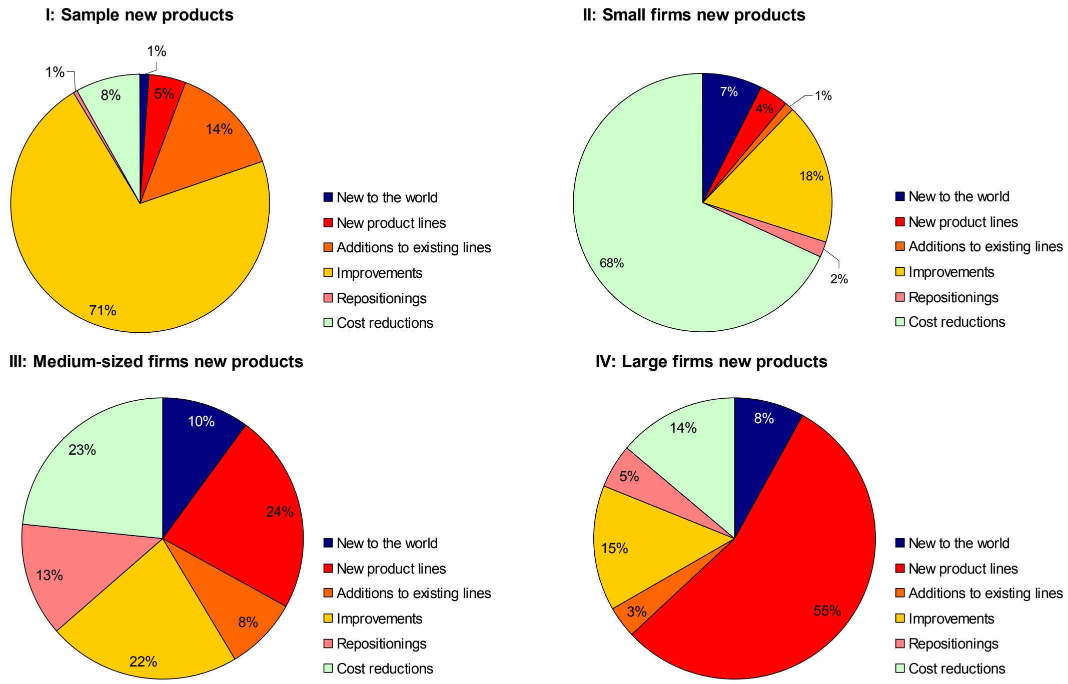
The results indicated that 85% of firms received technical support from suppliers, 75% of the firms within a company group received support from others brother-companies and 52% accessed to consultancy services. In the Portuguese case, few companies received technical support from competitors (10%), research institutes (19%) and universities (24%). If we considered size characteristics, the distribution of the responses highlights differences into the access to partners like universities, research institutes and R&D center. *Graphic 2* illustrated the technical support considering the firm size (number of employees).



	Others group companies' (if applicable)	Suppliers	Customers	Resellers	Competitors	Universities	Research institutes	Consultancy services	R&D centers	Trade associations
small	66,67%	81,48%	50,62%	30,86%	12,35%	13,58%	14,81%	35,80%	17,28%	28,40%
medium	78,26%	86,89%	49,18%	27,87%	9,84%	31,15%	18,03%	67,21%	34,43%	45,90%
large	73,33%	93,75%	68,75%	18,75%	6,25%	56,25%	43,75%	87,50%	56,25%	56,25%

Graphic 2: Technical Support by firm size.

We asked respondents to indicate how many new products their firms introduced into market during the 2002-2004 period, considering a classification developed by Booz-Allen & Hamilton (in Cooper, 2001). Results for the overall sample and by firm size are illustrated in *Graphic 3*.



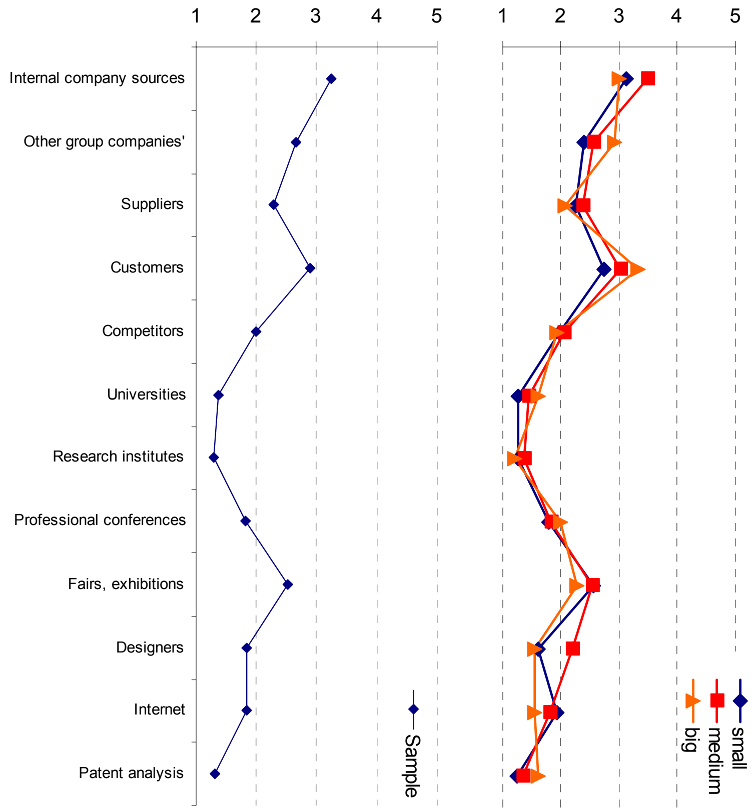
Graphic 3: New product introduction into market (2002-2004).

It is possible to visualize differences between the four pies. If we consider all respondents (*Graphic 3* - pie I) the improvements and revisions to existing products dominate with 71% of the new products launched. Only 1% of products are new-to-the-world. For small firms (*Graphic 3* - pie II) cost reductions are 68% of the new products. As Cooper pointed out on his description "from a marketing standpoint they are not new products, but from a design and production viewpoint, they could represent significant change to the firm" (Cooper, 2001, p.15). Medium-sized firms (*Graphic 3* - pie III) present a more equality introduction effort by the six categories of new products. More than 50% of introduction effort is in three types of products: new product lines (24%), cost reductions (23%) and improvements and revisions to existing products (22%). Finally, for large firms (*Graphic 3* - pie IV) additions to existing lines are 55% of new products.

In our analysis we also considered the new products development process, more specifically the sources of new product ideas. Therefore, we asked respondents to indicate the frequency that several external sources suggested or were in the origin of new product ideas. The frequency was captured by a five-point scale ranged from 1= "never" to 5= "always". The results are analysed by average response. *Graphic 4* illustrated the average response of sample and by firm size.

For sample (*Graphic 4* - left graphic) the most frequent source of new product ideas is internal company sources (response mean=3.3), followed by customers (2.9) and fairs and exhibitions (2.5). The less frequent sources are research institutes (1.3), patent analysis (1.3) and universities (1.4).

Considering the firm size (*Graphic 4* - right graphic) lines presented a similar behaviour. Nevertheless is possible to identify differences in the frequency of sources. Internal company sources are more frequent in medium-sized firms (mean=3.5) and comparatively less frequent in large firms (3.0). Suppliers' sources are less frequent among large firms (2.1) and more frequent for medium-sized (2.4). Customers' ideas are frequent for large firms (3.3). Designers' ideas are comparatively more frequent for medium-sized firms (2.2). Internet is a more frequent source of new product ideas for medium-sized and small firms.



Graphic 4: External sources to new product ideas (2002-2004): average response.

Scale reliability

Following the recommendations of Bourque e Fielder (1995) the research instrument used in the survey was developed by the research team adapting scales tested and validated in previous studies on literature. The proposed measures were purified by assessing their reliability and unidimensionality. Item-to-total correlations and Cronbach's α were examined in each of the proposed scales and items with low correlations were deleted. Then, a factor analysis was performed on items to assess the extent to which they reflect a single dimension (critical value > 50% variance explained – Jacob (2006)). Results are presented in *table 1*.

		Item-to-total Correlation	Cronbach's α	Factor Loading	Var Explained by One Factor
TCHAL	Technological Challenges				
	TCH1	0,6217	0,751	0,8475	66,90%
	TCH2	0,7022		0,8952	
	TCH3	0,4421		0,6980	
TFINVEST	Technological Future Investments				
	TFINV2	0,6551	0,777	0,9097	82,76%
	TFINV3	0,6551		0,9097	
ORGINOV	Innovation culture				
	INOV1	0,5254	0,759	0,7507	52,36%
	INOV2	0,6800		0,8513	
	INOV3	0,4987		0,7244	
	INOV4	0,4474		0,5914	
	INOV5	0,5243		0,6747	
PRODINOV	Product Innovativeness				
	PINOV2	0,8534	0,803	0,9308	92,938
	PINOV3	0,9788		0,9792	
	PINOV4	0,9719		0,9812	
NMTASK	Network Management Tasks				
	TASK1	0,5727	0,916	0,6472	54,81%
	TASK2	0,5550		0,6304	
	TASK3	0,7141		0,7796	
	TASK4	0,7577		0,8182	
	TASK5	0,7449		0,8039	
	TASK6	0,5744		0,6399	
	TASK7	0,6148		0,6729	
	TASK8	0,6035		0,6634	
	TASK9	0,7615		0,8148	
	TASK10	0,7463		0,8089	
	TASK11	0,7580		0,8178	
NMQUALIF	Network Management Qualifications				
	QUALIF1	0,6699	0,931	0,7272	59,35%
	QUALIF2	0,6792		0,7365	
	QUALIF3	0,6573		0,7143	
	QUALIF4	0,6818		0,7394	
	QUALIF5	0,6860		0,7435	
	QUALIF6	0,6688		0,7321	
	QUALIF7	0,7806		0,8273	
	QUALIF8	0,7641		0,8159	
	QUALIF9	0,7568		0,8095	
	QUALIF10	0,7412		0,7965	
	QUALIF11	0,7681		0,8194	
TSUPP	Technical Support				
	TS6	0,4278	0,6970	0,6602	45,51%
	TS7	0,4829		0,7080	
	TS8	0,4871		0,7027	
	TS9	0,4359		0,6524	
	TS10	0,4399		0,6472	
MSNPD	Market Sources for NPD				
	MS1	0,4157	0,773	0,5709	43,52%
	MS3	0,3590		0,5081	
	MS4	0,6091		0,7563	
	MS5	0,5582		0,7096	
	MS6	0,4597		0,6217	
	MS7	0,6470		0,7861	
	MS8	0,4656		0,6181	
ISNPD	Institucional Sources for NPD				
	IS1	0,8313	0,906	0,9569	91,66%
	IS2	0,8313		0,9569	

Table 1: Scale reliability.

- Technological Challenges (TCHAL) was measured by the three items adapted from Avlonitis et al (1994) study. The items capture the firm's technological challenges faced by firms concerning its machinery, its production methods and its raw materials (α=0.75; 70% var. explained by one factor).

- Technological Future Investments (TFINVEST) retained only two items of Avlonitis et al (1994) scales because future investment on machinery need to be deleted in order to guarantee the reliability of scale. As a result, our scale only consider the strategic intentions of investment of firms on production methods and raw materials (α=0.78; 83% var. explained by one factor).
- Innovation culture (ORGINOV) was measured by the five items adapted from Hult and Hurley (1998) scale of innovativeness (α=0.76; 52% var. explained by one factor). This scale measures the degree of firm's openness to innovation.
- Product innovativeness (PRODINOV). Data values for the six new product type were subjected to a square root transformation, in order to correct possible nonnormality and heteroscedasticity (Hair et al, 1998). Based on scale reliability analysis, our construct only captures three levels adapted from the classification of Booz-Allen & Hamilton (Cooper, 2001): new product lines, additions to the existing product lines and, improvements to existing products (α=0.80; 92% var. explained by one factor).
- Network management tasks (NMTASK) were measured by the eleven items adapted from the NetCompTest scale (Ritter et al, 2002). As name suggests this scale measure the level of execution of several tasks concerning network management (α=0.92; 55% var. explained by one factor).
- Network management qualifications (NMQUALIF) were measured by the eleven items adapted from the NetCompTest scale items (Ritter et al, 2002). This scale measures the level of qualification possessed by people responsible for contact with firm's external partners (α=0.93; 59% var. explained by one factor).
- Technical support (TSUPP) retained six of the ten items that were used for this study based on the conceptual work of Gemunden et al (1996). (α=0.70; 46% var. explained by one factor). Faced with the slightly – but not alarming – low percentage of variance explained, we analyzed the factor loading of items and concluded that they were acceptable (>0.50). Because of conceptual relevance, we have chosen to retain this indicator. Consequently, this scales access the technical support provided to firm by universities or other high education institutes, government or private non-profit research institutes, consultancy services, technological centers and trade associations
- Market source for new product ideas (MSNPD) retained seven of the eight items that were developed for this study. Our construct used four items from the "scale of sources of information for innovation" of the Third Community Innovation Survey (CIS3) (European Commission, 2004) and included three new items (designers, internet and patent analysis) (α=0.77; 44% var. explained by one factor). We analyzed the factor loading of items and concluded that they were acceptable, and therefore we have chosen to retain this indicator because of conceptual relevance. This scale measures the frequency level of new ideas provided to firms by market sources as suppliers of equipment, materials, components and software; competitors and other enterprises from the same industry; professional conferences, meetings, journals; fairs, exhibitions, designers, internet and patent analysis.
- Institutional source for new product ideas (ISNPD) was measured with two institutional items considered on the scale of "sources of information for innovation" of the Third Community Innovation Survey (CIS3) (European Commission, 2004). This scale measures the frequency level of new ideas provided to firms by institutional

sources as universities or other higher education institutes and government or private non-profit research institutes (α=0.91; 92% var. explained by one factor).

Constructs dimensions: factor analysis

Final scales (indicators) were computed as the mean of the retained items from the scale reliability analysis. To isolate the fundamental dimensions of an integrated solution, we then carried out a factor analysis to all the proposed indicators. The principal component analysis with varimax orthogonal rotation produced a three-factor solution represented in *Table 2*. For ease of interpretation, we decided to delete factor loadings lower than 0.50.

First factor is composed with variables that reflect the capacity of acquisition into a innovation network of technical support and new product ideas (indicators TSUPP, MSNPD and ISNPD) and the technological future investments considering methods of production and raw materials (indicator TFINVEST). The negative sign of technological future investments can signify that or firms had already done all necessary investments on production methods and raw materials or that this factor concerns commodity products. Despite which one is the real reason, it is evident that these firms are open to the network and are looking into the network to access new product ideas and technological improvements. Second factor illustrates what we perceive as innovative network leadership - the innovative culture of firms and its network management skills (indicators ORGINOV, NMTASK, and NMQUALIF). Finally, third factor is composed by two variables indicating the technological challenges faced by firms and its newness of products (indicators TCHAL and PRODINOV). This indicates the impact of technology on firms and suggests a competitive technological environment which requires firm innovative behavior by new product introduction. The proposed relationships should be considered as exploratory, needing further empirical confirmation.

			Factor loadings [a]		
			Factor 1	**Factor 2**	**Factor 3**
1	TCHAL	Technological Challenges			0,7832
2	TFINVEST	Technological Future Investments	-0,5525		
3	ORGINOV	Innovation culture		0,6227	
4	PRODINOV	Product Innovativeness			0,7064
5	NMTASK	Network Management Tasks		0,7349	
6	NMQUALIF	Network Management Qualifications		0,7743	
7	TSUPP	Technical Support	0,5568		
8	MSNPD	Market Sources for NPD	0,7799		
9	ISNPD	Institutacionl Sources for NPD	0,7787		
		Eigenvalues	2,87482	1,25435	1,17770
		Total variance explained (%)	24,36	20,62	13,99
		Cumulative variance explained (%)	24,36	44,98	58,97

[a] Principal Component Analysis with Varimax (Kaiser Normalization): rotation converged in 5 iterations.

Table 2: Principal components analysis of all the proposed indicators

Considering the dimensions of our proposed constructs - innovativeness and innovation network competence - we carried out separated factor analysis for both constructs. In both constructs, the number of factors was extracted considering eigenvalues superior to 1. The two-factor solution explains a satisfactory proportion (superior to 60%) of the total variance. The findings show a clear factor structure, indicating a two-dimensional interpretation of original constructs. A summary of these results is show in *Table 3*. For ease of interpretation, we decided to delete factor loadings lower than 0.50.

For the innovativeness construct (*Table 3* - part I) we identify two factors. A first factor is composed by strategic innovation intention concerning methods of production and raw materials (indicator TFINVEST) and by innovation culture (ORGINOV). The negative sign of innovation culture was expected because firms with a strategic emphasis on production are more skeptical and resistant to change/ innovation. The second factor identified for innovativeness is composed by two variables indicating the technological challenges faced by firms and its newness of products (indicators TCHAL and PRODINOV). This factor had already been identified on the integrated solution and suggests that in competitive technological environments firms adopt innovative behavior by new product introduction.

I - Variables measuring innovativeness

			Factor loadings [a]	
			Factor 1	**Factor 2**
1	TCHAL	Technological Challenges		0,7336
2	TFINVEST	Technological Future Investments	0,8412	
3	ORGINOV	Innovation Culture	-0,7159	
4	PRODINOV	Product Innovativeness		0,8106
		Eigenvalues	1,43761	1,13291
		Total variance explained (%)	34,08	30,18
		Cumulative variance explained (%)	34,08	64,26

II - Variables measuring innovation network competence

			Factor loadings [b]	
			Factor 1	**Factor 2**
5	NMTASK	Network Management Tasks		0,7234
6	NMQUALIF	Network Management Qualifications		0,9042
7	TSUPP	Technical Support	0,6279	
8	MSNPD	Market Sources for NPD	0,7712	
9	ISNPD	Institutacionl Sources for NPD	0,8476	
		Eigenvalues	2,32232	1,11049
		Total variance explained (%)	39,02	29,64
		Cumulative variance explained (%)	39,02	68,66

[a] Principal Component Analysis with Varimax (Kaiser Normalization): rotation converged in 3 iterations.

[b] Principal Component Analysis with Varimax (Kaiser Normalization): rotation converged in 3 iterations.

Table 3: Dimensions of the proposed construct

For the innovation network competence (*Table 3* - part II) we identify two factors similar to our conceptual construct. The fist factor, named competence, is composed by variables which clearly indicate firm management of network (indicators NMTASK and NMQUALIF). The second factor, named commitment, is composed by variables which clearly indicate firm capacity of acquisition of technical support and new product ideas (indicators TSUPP, MSNPD and ISNPD).

CONCLUSIONS AND MANAGEMENT IMPLICATIONS

This paper develops the innovativeness and innovation network competence constructs and identifies its dimensions. It provides a summary of the current debate and research on innovativeness and network competence and empirically studies our constructs dimensions and integration. Results support our perspective of bi-dimensional constructs and highlight the importance of both constructs. Our innovativeness construct considers two dimensions: a technological dimension - concerning technological challenges faced by firms and its future investments intentions-, and a behavioral dimension – concerning the innovation culture and product innovativeness possessed by firms. Our innovation network competence construct considers two dimensions: a management dimension – task and qualification for network management -, and a commitment dimension that represents the firm capacity of acquisition into an innovation network – technical support, market and institutional sources for NPD.

Our integration results suggests the interdependence of network competence and innovativeness in a product innovation context and confirms that "innovation is a social process; hence the effects of other firms or individuals on innovativeness can not be ignored" (Hausman, 2005, p.778). It is unanimous the recognition of the importance of a network, namely at the innovation level to create, develop and share knowledge and resources. Therefore, the knowledge of the innovativeness and innovation network competence dimensions could help managers in two ways. First, they can use it as a diagnosis tool of their strategic innovativeness and network behavior and commitment. Finally, they can use the underlying variables as key factors to improve their innovation network alignment with business goals and plans.

As future work, we intend to analyze and discuss the specificity of small firms on innovation. We also intend to study the impact of innovativeness and innovation network competence on organization success. At a first stage, our research will comprehend a definition of a structural equation model concerning the following set of three hypotheses: (1) increased innovativeness has a positive effect on firm's performance, (2) increased innovation network competence has a positive effect on firm's innovativeness and (3) increased innovation network competence has a positive effect on firm's performance.

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