Organizational learning capability, innovation and export intensity: Evidence from Italian and Spanish ceramic tiles producers

1. Introduction

Organizational learning, generally defined as the process by which organizations learn, has been considered by academics and practitioners as essential for organizations mainly due to the fast changing environment (Day, 1994; Slater & Narver, 1995; Hult, 1998). Consequently, organizational learning capability, considered as the organizational and managerial characteristics that facilitate the organizational learning process or allow an organization to learn, plays an essential role in this process.

Previous research has linked organizational learning to important competitive issues such as innovation (McKee, 1992; Hurley & Hult, 1998) and internationalization (Tsang, 1999; Zahra, Ireland & Hitt, 2000; De Clerq, Sapienza & Crijns, 2005). However, a wider focus that takes into account the impact of OLC on innovation performance and export intensity is still missing from extant literature. This study clarifies and measures the contribution of OLC to innovation performance and thereby to competitive advantage in export markets. Following the conceptualization of OLC developed by Chiva and colleagues (2007) we formulate hypotheses on the respective effects of OLC and innovation performance on export intensity.

We make two contributions to the literature. First, we propose and test a model in which innovation plays a mediating role in the relationship between OLC and export intensity. Second, we explain intra-industry differences in export performance as a function of the interaction between OLC and innovation.

The introduction is followed by a brief review of the concept of OLC, with an emphasis on its dimensions or organizational learning facilitating factors, and innovation performance. We then develop our hypotheses on the relationships between OLC, innovation performance and export intensity. Following this, we test the hypotheses with the structural modeling technique, using data from the Italian and Spanish ceramic tile industry. We conclude with a discussion of the results and their implications.

2. Conceptual framework and hypotheses

2.1. Organizational Learning Capability

Organizational learning can be understood as the process of social construction of shared beliefs and meanings, in which the social context plays an essential role (Chiva & Alegre, 2005). The concept of OLC (Dibella et al., 1996; Goh & Richards, 1997; Hult & Ferrell, 1997; Yeung, Ulrich, Nason, & Von Glinow, 1999) emphasizes the importance of the facilitating factors of organizational learning or the organizational propensity to learn. Goh and Richards (1997, p. 577) define OLC as the organizational and managerial characteristics or factors that facilitate the organizational learning process or allow an organization to learn.

Recently, Chiva et al. (2007) proposed a new conceptualization of OLC through a comprehensive integrative analysis of all the theoretical perspectives and literatures involved in the facilitating factors for organizational learning. Five facilitating factors of organizational learning were identified: experimentation, risk taking, interaction with the external environment, dialogue and participative decision making. We follow the same OLC conceptualization because it incorporates ideas from most approaches of the organizational learning facilitating factors.

Experimentation is defined as the degree to which new ideas and suggestions are attended to and dealt with sympathetically. Experimentation is the most heavily supported dimension in the organizational learning literature (Hedberg, 1981; Tannembaum, 1997; Weick & Westley, 1996; Ulrich, Jick & Von Glinow, 1993; Goh & Richards, 1997; Pedler et al., 1997). Experimentation involves trying out new ideas, being curious about how things work, carrying out changes in work processes, searching for innovative solutions to problems (Garvin, 1993; Nevis, DiBella, & Gould, 1995).

Risk taking is conceived as the tolerance of ambiguity, uncertainty, and errors. Hedberg (1981) proposes a range of activities to facilitate organizational learning, amongst which he stresses the design of environments that assume risk taking and accept mistakes. Kouzes and Posner (1987) claim that the key to opening up business opportunities lies in learning from the successes and mistakes that arise from risk taking. According to Sitkin (1996, p. 547), the benefits brought about by error are risk tolerance, prompting of attention to problems and the search for solutions, ease of problem recognition and interpretation, and variety in organizational responses. Since the appearance of this work, many authors have underlined the importance of risk

taking and accepting mistakes in order for organizations to learn (Tannembaum, 1997; Popper & Lipshitz, 2000).

Interaction with the external environment is defined as the scope of relationships with the external environment. The external environment of an organization is considered as factors that are beyond the organization's direct control of influence, including competitors, and the economic, social, monetary and political/legal systems, among others. Environmental characteristics play an important role in learning, and their influence on organizational learning has been studied by a number of researchers (Nevis et al., 1995; Goh & Richards, 1997; Bapuji & Crossan, 2004). Relations and connections with the environment are relevant because the organization attempts to evolve simultaneously with its changing environment.

Dialogue is defined as a sustained collective inquiry into the processes, assumptions, and certainties that make up everyday experience. Schein (1993, p. 47) considers dialogue as a basic process for building common understanding, in that it allows one to see the hidden meanings of words, first by revealing these hidden meanings in our own communication. Some authors (Isaacs, 1993; Schein, 1993; Dixon, 1997) understand dialogue to be vitally important to organizational learning. Although dialogue is often seen as the process by which individual and organizational learning are linked, Oswick and colleagues (2000) show that dialogue is what generates both individual and organizational learning, thus creating meaning and comprehension.

Participative decision making refers to the level of influence employees have in the decision-making process. Organizations implement participative decision making to benefit from the motivational effects of increased employee involvement, job satisfaction and organizational commitment (Cotton et al., 1988; Daniels & Bailey,

1999; Witt, Andrews & Kacmar, 2000). A number of scholars (Nevis et al., 1995; Goh & Richards, 1997; Pedler et al., 1997, Scott-Ladd & Chan, 2004; Bapuji & Crossan, 2004) consider participative decision making to be one of the aspects that can facilitate learning.

2.2. Innovation Performance

Innovation consists of successful exploitation of new ideas (Myers & Marquis, 1969). It therefore requires that two conditions be met: novelty and use. In general, the requisite of novelty is verified since the innovation process puts into practice an invention, a scientific discovery or a new production or management technique. The requisite of utility is borne out through its use or commercial success. A 'product' is a good or service offered to the customer, and a 'process' is the way the good or service is produced and delivered (Barras, 1986). Thus, product innovation is defined as the product or service introduced to meet the needs of the market or of an external user, and process innovation is understood as a new element introduced into production operations or functions (Damanpour & Gopalakrishnan, 2001).

Following Alegre et al. (2006), we conceive innovation performance as a construct with two different dimensions: product innovation efficacy and innovation efficiency. Product innovation efficacy reflect the degree of success of an innovation. On the other hand, innovation efficiency reflects the effort carried out to achieve that degree of success.

2.3. Linking Organizational Learning Capability, Innovation and Export Intensity

Export intensity is said to be enhanced by an organization's ability to learn. In general, firms that are able to learn about other organizations (customers, suppliers, and

competitors), market evolution and technology changes stand a better chance of sensing and acting upon a dynamic environment. Learning oriented organizations are in a better position to outperform their competitors with regard to customer retention and sales growth (Tippins & Sohi, 2003). Firms that learn efficiently from their experience are able to expand overseas faster and with fewer mistakes (Tsang, 1999). Knowledge renewal and exploitation regarding foreign markets may increase export intensity.

OLC enhances knowledge creation and integration within the firm; this knowledge constitutes a crucial input for the innovation process (Helfat & Raubitschek, 2000). On the other hand, innovation has been shown to impact positively in export performance (Pla-Barber & Alegre, 2007). Therefore, we argue that the link between OLC and export intensity is mediated by innovation performance. The following hypothesis is put forward.

H1: The relationship between OLC and export intensity is mediated by innovation performance.

Organizational learning can be easily linked to innovation outcomes. Zaltman, Duncan and Holbek (1973) point out that a critical part of the first stage of the innovation process is openness to the innovation; that is, whether the members of an organization are willing to learn and change or are resistant to innovation. Knowledge is the output of the learning process and the input of the innovation process. In fact, organizational learning and innovation overlap in the definition of innovation as successful implementation of creative ideas within an organization (Amabile et al., 1996).

Prior research suggests that organizational learning affects product innovation performance. McKee (1992) understands product innovation as an organizational learning process and claims that directing the organization toward learning fosters innovation effectiveness and efficiency. Wheelwright and Clark (1992) suggest that learning plays a determinant role in new product development projects because of changing environmental factors such as customer demand uncertainty, technological developments or competitive turbulence. Furthermore, a number of scholars consider learning orientation as an antecedent of the "market-driven innovation" (Hurley & Hult, 1998). Orientation towards markets provides sources of ideas for change and improvement. Such new ideas will be appreciated and effectively assimilated into new product developments by adopting a learning orientation.

Additionally, innovation speed and time-based competition are critical for success (Wheelwright & Clark, 1992). Innovation speed may either provide the firm with first-mover advantages (Liebermann & Montgomery, 1988) or limit a competitor's first-mover advantages, if the firm is a follower. It is widely accepted that firms with short development cycles outperform firms with long development cycles (Takeuchi & Nonaka, 1986; Gupta & Wilemon, 1990). Recently, Sarin and McDermott (2003) found that organizational learning at the team level had a strong positive effect on the innovativeness and the speed to market of the new products. Lapré and Van Wassenhove (2001, 2002) also revealed a positive effect of learning on the efficiency of process innovations projects.

In sum, we argue that OLC contributes to innovation performance, understood as a concept with three dimensions: product and process innovation effectiveness and innovation efficiency. Therefore, we hypothesize:

H2: OLC is positively related to innovation performance.

According to prior research, innovation is closely linked to export intensity. Recently, Pla-Barber and Alegre (2007) found that this positive link had general support from several theoretical streams. Firstly, technology-based models of international (Posner, 1961; Vernon, 1966), when applied at the firm level, suggest that innovation confers market power and, as a consequence, facilitates a better export performance. Secondly, the resource-based view of the firm assumes that firms can regarded as a set of resources, that these resources are heterogeneously distributed across firms, and that resource differences might persist over time (Teece et al., 1997). Based on these assumptions, it has been theorized that valuable and rare resources constitute the foundation of competitive advantage in international markets (Pla-Barber, 2001; Fahy, 2002; López-Rodríguez and García-Rodríguez, 2005). Finally, the technology and innovation management literature generally predicts that innovative firms will have a tendency to enter foreign markets in order to increase sales volume and spread the fixed costs of innovation over a larger number of units (Tidd, Bessant & Pavitt, 1997; Rogers, 2004). Thus, we hypothesise:

H 3: Innovation performance has a positive effect on export intensity.

Figure 1 represents the research hypotheses of this study.

Insert Figure 1 about here

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3. Methodology

3.1. Sample and Data Collection Procedure

We test our hypotheses by focusing on a single industry: Italian and Spanish ceramic tile producers. Knowledge manifests itself in various ways in different industries. Thus, the analysis of a single industry may be advantageous to assess OLC and innovation performance, as knowledge and learning involved in innovation processes will be likely to be more homogeneous (Santarelli & Piergiovanni, 1996).

Italian and Spanish ceramic tile production in 2004 represented 77% (Ascer, 2004) of EU production. The world's biggest ceramic tile producer is China, followed by Spain, Italy, Brazil and Turkey. The ceramic tile industry is largely globalized. However, Italian and Spanish firms lead world ceramic tile exports thanks to superior technology and design. These firms have substantial common traits. Most of them are considered to be SMEs, as they do not generally exceed an average of 250 workers and they tend to be geographically concentrated in industrial districts: Sassuolo in Northern Italy and Castellón in Eastern Spain (Chamber of Commerce of Valencia, 2004). Features of the ceramic tile industry suggest it belongs to the scale-intensive and the science-based trajectories of Pavitt's taxonomy (Pavitt, 1984; Patel & Pavitt, 1995). In the production of ceramic tiles, technological accumulation is mainly generated by (1) the design, building and operation of complex production systems (scale-intensive trajectory), and (2) knowledge, skills and techniques emerging from academic chemistry research (science-based trajectory). Previous studies provide compelling evidence of the significant innovating behavior of Italian and Spanish ceramic tile producers (Enright & Tenti, 1990; Alegre et al., 2004).

Finally, by focusing our data collection on the ceramic tile industry, we reduce the range of extraneous variations that might influence the constructs of interest. We recognize the shortcoming of such sampling, but we believe that the advantages of this approach outweighed the disadvantages of limited generalizability.

Field work was undertaken from June to November 2004. A pre-test was carried out on four technicians from ALICER, the Spanish Centre for Innovation and Technology in Ceramic Industrial Design, to assure that the questionnaire items were fully understandable in the context of the ceramic tile industry. The questionnaire was applied using a 7-point Likert scale (Appendix).

A key informant technique consistent with previous studies was used to obtain data (Kumer, Stern & Anderson, 1993). The questionnaire was addressed to various company directors. The Product Development Manager responded to the innovation performance questions, while the Human Resource Manager answered items dealing with OLC. An appointment was established with the respondents so that the questionnaire could be answered in a personal interview. Following Malhotra (1993), we offered a feedback report on the survey results to the participating firms in order to encourage firms to answer. Export intensity was obtained through secondary objective sources (Ascer, 2006; Assopiastrelle, 2006)

Our study received a total of 183 completed questionnaires, 82 from Italian firms and 101 from Spanish firms. The sample obtained represents around 50% of the population under study (Chamber of Commerce of Valencia, 2004). Both the number of responses and the response rate can be considered satisfactory (Spector, 1992; Williams, Gavin & Hartman, 2004). Nonresponse bias was assessed through a comparison of sample statistics to known values of the population such as annual sales

volume, number of employees. The websites of the Italian (Assopiastrelle, 2006) and the Spanish (Ascer, 2006) associations of ceramic tiles producers offer this information for most of the industry companies.

3.2. Measures

*OLC measurement scale***.** From the OLC concept adopted in our theoretical review, we select the measurement instrument developed by Chiva et al. (2007). The instrument comprises a set of scales that represent theoretical dimensions or latent variables through their items. Following this instrument, we conceive OLC as a construct with five different dimensions consistent with the previous literature: experimentation, risk taking, interaction with the external environment, dialogue and participative decision making. Chiva et al. (2007) was validated at the employee level through a employee-based survey in the ceramic tiles industry. In this research we aim to implement again the same measurement scale in the same industry at the firm level by asking a key respondent: the Human Resource Manager.

Innovation performance measurement scale. Following Alegre et al., (2006), we conceive product innovation performance as a construct with two different dimensions consistent with the previous literature: product innovation effectiveness and innovation efficiency. These dimensions have been widely discussed in innovation research (Brown & Eisenhardt, 1995; OECD-EUROSTAT, 1997). The OECD Oslo Manual provides a detailed measurement scale to assess the economic objectives of product and process innovation, the scale that we propose to measure product and process innovation effectiveness. This scale was put forward by the OECD to provide some coherent drivers for innovation studies, thereby achieving a greater homogeneity and

comparability among innovation studies. Nowadays, many innovation surveys use this widely validated scale.

Innovation efficiency is the second dimension taken into account to measure innovation performance. It is widely accepted that innovation efficiency is determined by the cost and the time involved in the innovation project (Wheelwright and Clark, 1992; Brown and Eisenhardt, 1995; Chiesa, Coughlan, & Voss, 1996). Both cost and development time have been measured objectively (Griffin, 1993) and subjectively (Valle and Avella, 2003). Objective measurement usually refers to a specific innovation project that has been analyzed in detail, while subjective measurement has generally been implemented in innovation surveys.

Besides the relevance of cost and time to determine innovation process efficiency, several studies have also included a subjective assessment on overall innovation project efficiency. Ancona and Caldwell (1992) used subjective assessment items on overall innovation performance in their research into external communications of product development teams. Barczak (1995), in her empirical study in the telecommunications industry, also uses an overall satisfaction item with the firms' new product development efforts to measure performance. Chiesa et al. (1996) also introduced perceptive assessments in their innovation efficiency audit toolbox. The four-item scale we propose to measure innovation efficiency is consistent with this issue.

Export intensity represents the share of exports in total sales for a particular firm. This variable is by far the most widely used indicator in empirical international business research. Also, as it is an objective measurement, this indicator does not suffer from the problem of manager resistance concerning confidentiality (Majocchi et al., 2005). We

obtained these data through the collaboration of the Italian and Spanish ceramic tiles associations (Assopiastrelle, 2006; Ascer, 2006).

Firm size was included as a control variable in the overall model since it could explain the variation in export intensity. Large companies are considered to possess more financial and human resources and higher economy of scale levels (Wagner, 1995; Wagner, 2001). These characteristics facilitate their entry into international markets (Leonidou, 1998). Moreover, small size is narrowly related to a number of export barriers (Leonidou, 1995) such as the level of risks in foreign markets (Piercy et al. 1998; Preece et al., 1998; Majocchi, Bacchiocchi & Mayrhofer, 2005). In many studies, firm size has been considered as a contributing variable to export performance (Mittelstaedt, Harben & Ward, 2003). Respondents were asked to classify their company into one of the six categories according to the number of employees, devised *ad hoc* on the advice of the four ALICER technicians who participated in the study, and by bearing in mind that the ceramic tile industry predominantly consists of SMEs. Table 1 shows the distribution of sample firms according to their size category and location.

Insert Table 1 about here

3.3. *Analyses*

The primary analyses of the data set are based on structural equations modeling (SEM). SEM has been developed in a number of academic disciplines to substantiate theory. This approach involves developing measurement models to define latent variables and

then establishing relationships or structural equations among the latent variables. EQS 6.1 software was used to estimate the models for our research hypotheses. Confirmatory Factor Analysis (CFA) was used to check the goodness of the measurement scales.

One common rule-of-thumb on the minimum threshold for SEM use is that of 100 subjects (Williams et al., 2004); our sample meets this threshold. Applying SEM has the advantage that the three links can be examined simultaneously in the same analysis, which is appropriate to analyse a mediating effect (Tippins & Sohi, 2003). Furthermore, SEM has a number of additional advantages over regression analysis: mainly that it reports measurement errors and makes it possible to test the reliability and validity of the measurement instruments (Hair et al., 1998; Dhanaraj & Beamish, 2003).

4. Results

4.1. Psychometric Properties of Measurement Scales

The psychometric properties of the measurement scales were assessed in accordance with accepted practices (Gerbing & Anderson, 1988; Tippins & Sohi, 2003), and included content validity, reliability, discriminant validity, convergent validity, and scale dimensionality. Table 2 exhibits factor correlations, means, and standard deviations.

Content validity was established through a revision of extant literature and through personal interviews with ceramic tile industry experts (four ALICER technicians). We computed the coefficient alpha to assess scale reliability. All scales achieved acceptable coefficient alphas of at least 0.70 (Table 2).

Insert Table 2 about here

Discriminant validity was assessed through confirmatory factor analysis (CFA) by comparing the χ^2 differences between a constrained confirmatory factor model with an interfactor correlation set to 1 (indicating they are the same construct) and an unconstrained model with an interfactor correlation set free . All χ^2 differences were found to be significant, providing evidence of discriminant validity (Anderson & Gerbing, 1988; Gatignon, Tushman, Smith, & Anderson, 2002; Tippins & Sohi, 2003). CFA was also used to establish convergent validity by confirming that all scale items loaded significantly on their construct factors (Anderson & Gerbing, 1988). Additionally, convergent validity was also confirmed by comparing the χ^2 differences between a constrained confirmatory factor model with an interfactor correlation set to 0 (indicating that there is no relationship between the two constructs) and an unconstrained model with an interfactor correlation set free. All χ^2 differences were found to be significant, providing evidence of convergent validity (Gatignon et al., 2002).

To confirm dimensionality we ran second-order CFAs. The loadings of the measurement items on the first-order factors, and the loadings of the first-order factors on the second-order factors were all significant at $p<0.001$. Furthermore, the comparative fit index (CFI) exceeded the recommended value of 0.90 for the three measurement models, indicating good model fits and a confirmation of the scale dimensionality.

4.2. Testing of the Research Hypotheses

Adopting the approach used by Singh, Goolsby and Rhoads (1994) and followed by Tippins and Sohi (2003), we showed the presence of a mediating effect, by performing a competing model analysis. The first model (direct effect) examined the direct relationship between OLC and firm performance, while a second model (partial mediation) examined the same relationship with innovation performance acting as a mediator.

Figure 2 and 3 show the results of the competing model analysis. The chi-square statistic for each model is significant, but other relevant fit indices suggest a good overall fit (Seibert, Kraimer & Liden., 2001; Tippins & Sohi, 2003). Results provide evidence that innovation performance mediates the relationship between OLC and export intensity for the following reasons. First, the partial mediation model explains more variance than the direct effect model (0.65 vs. 053). Second, there is a positive and significant relationship between OLC and innovation performance that supports Hypothesis 2 (H2: β=0.69, t=6.02). Third, there is also a positive and significant relationship between innovation performance and export intensity that supports Hypothesis 3 (H3: β=0.79, t=7.88). And fourth, the relationship between OLC and firm performance indicated in the direct effect model (β=0.53, t=5.79) becomes lower and nonsignificant in the partial mediation model (β=0.03, t=0.33). Thus, the partial mediation model represents an improvement over the direct effect model and supports Hypothesis 1.

Insert Figure 2 about here

Insert Figure 3 about here

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5. Discussion

The possibility that organizational learning can provide firms with a basis for competitive advantage has received a great deal of attention in recent years. While some claim that organizational learning affects firm performance, others understand that more adequate and direct dependent variables should be used in order to evaluate its impact in organizations.

The main objective of this paper was to investigate the relationship between OLC, innovation and export intensity. This research provides evidence that OLC enhances innovation performance, which indirectly contributes to export intensity. Thereby our study provides further empirically validated research on organizational learning, a research area in which empirical tests are scarce (Edmondson, 1999). A survey was implemented in the Italian and Spanish ceramic tiles producers because they clearly lead international ceramics tiles industry in terms of technology, productivity, quality and design.

As innovation performance is found to be directly affected by OLC, and the two constructs are strongly linked, we can consider the former as a direct criterion of OLC success. The use of innovation performance as a direct criterion of OLC success can be

viewed as a way of understanding how organizational learning affects firm performance, a direction for future research identified by Lyles & Easterby-Smith (2003; p. 644).

Innovation performance is positively related to export intensity. This provides confirmation to previous findings dealing the benefits of product innovation effectiveness and innovation efficiency (Montoya-Weiss & Calantone, 1994; Hatch & Mowery, 1998; Calantone et al., 2002; Sarin & McDermott, 2003; Hult et al., 2004).

Furthermore, our study contributes to international business literature by supporting the perspective that a firm's export intensity depends on its innovation performance, by also taking into account that the latter is affected by OLC. We thus propose key antecedents to export intensity. Accordingly, when an organization develops certain practices (OLC), it is more able to learn, to develop new knowledge and consequently to innovate. Through innovation firms generate new product that are more attractive or more technology-advanced. Innovation may also be useful to adapt existing products to overseas tastes and wants. This finding is important for both academics and practitioners.

Research that determines the dimensions of OLC and analyses the relationship between OLC, innovation performance, and export intensity is likely to prove particularly valuable at a practical level. In particular, evidence form this study underscores the importance of managerial emphasis on organizational features that enhance learning. Organizational learning facilitating factors should be taken into account when setting innovation and export objectives. Managers can foster the introduction or enhancement of organizational and managerial characteristics that will

facilitate organizational learning, in the knowledge that these will have an impact on innovation and export performance.

Our results must be viewed in the light of the study's limitations. As with all cross-sectional research, the relationship tested in this study represents a snapshot in time. While it is likely that the conditions under which the data were collected will remain essentially the same, there are no guarantees that this will be the case. Because we have carried out a single industry analysis, our study has benefited from dealing with firms that are likely to be economically and technologically homogeneous. However, it must be stressed that single industry conclusions should be considered with caution. Cross-national studies are still needed to compare ceramic tiles producers with different technology level and specific cultural features: it could be interesting to compare Italy and Spain with other relevant global producers such as China, Brazil or Turkey. Finally, the results of this study provide further guidance for future research: further investigations are needed to confirm the applicability of these findings to industries that differ substantially from that of ceramic tile production. More in-depth analysis, perhaps through case studies, is required to explore the impact of OLC through the different innovation process steps.

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FIGURE 1: Conceptual model.

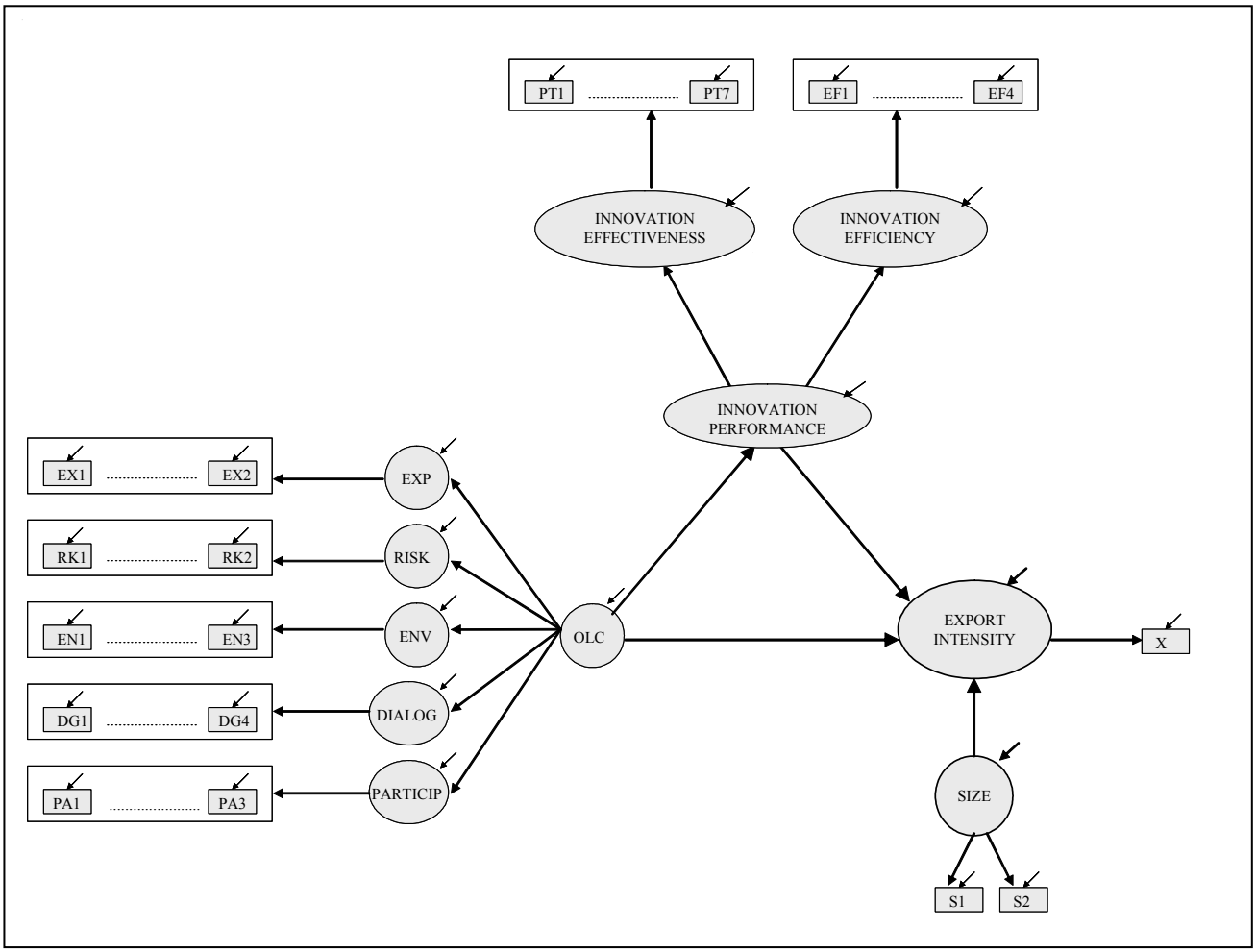


TABLE 1: Sample firm size and location

	Number of Employees						
	(1) Fewer than 25	(2) Between 25 and 49	(3) Between 50 and 99	(4) Between 100 and 199	(5) Between 200 and 300	(6) Over 300	Total
Italian Firms	5	12	19	18	7	21	82
Spanish Firms	6	21	43	18	8	5	101
Total	11	33	62	36	15	26	183

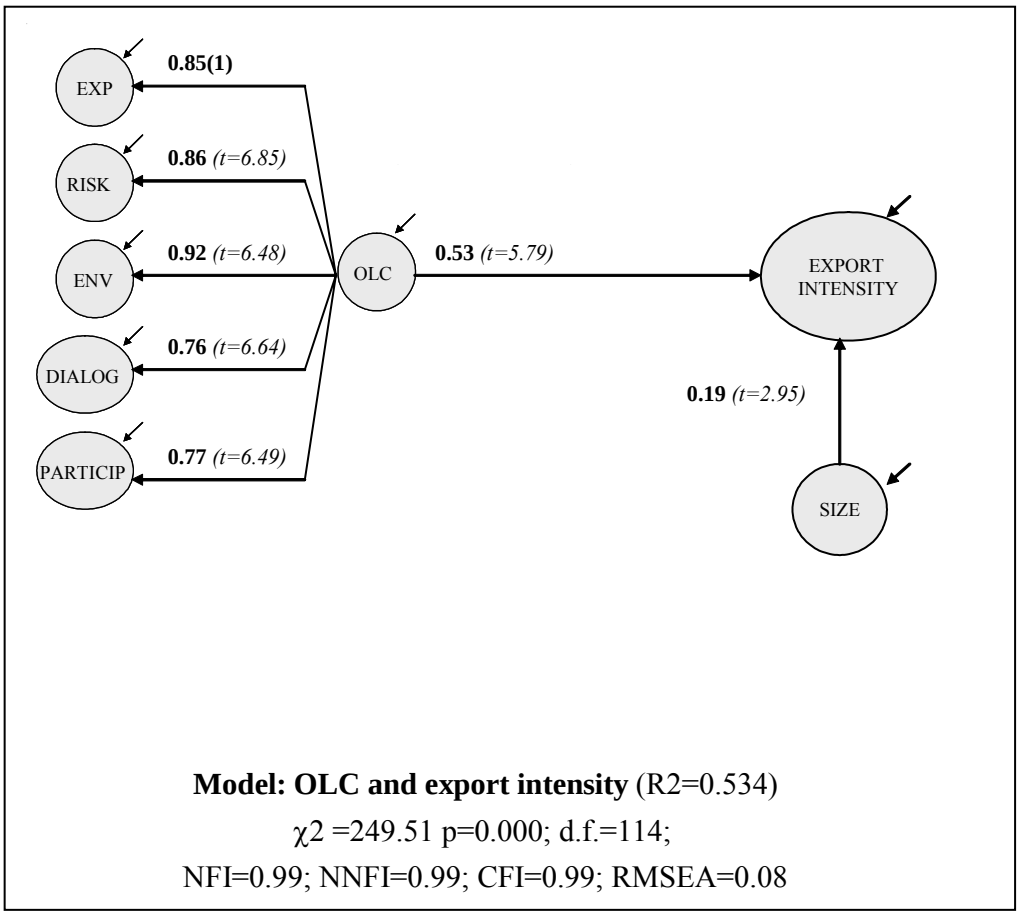
TABLE 2: Factor correlations, means, standard deviations, and alpha reliabilities

	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. EXP	5.24	1.13	(0.74)								
2. RISK	4.58	1.39	0.53*	(0.70)							
3. ENV	4.78	1.34	0.59*	0.60*	(0.82)						
4. DIALOG	5.48	1.08	0.60*	0.38*	0.52*	(0.83)					
5. PARTICIP	4.58	1.41	0.45*	0.56*	0.62*	0.48*	(0.88)				
6. INNOVATION EFFECTIVENESS	5.08	1.11	0.48*	0.38*	0.46*	0.55*	0.33*	(0.91)			
7. INNOVATION EFFICIENCY.	4.69	1.21	0.44*	0.41*	0.48*	0.54*	0.42*	0.84*	(0.92)		
8. SIZE	3.33.	1.44	0.31*	0.40*	0.34*	0.23*	0.29*	0.33*	0.40*	--	
9. EXPORTS	44.47	20.09	0.48*	0.36*	0.47*	0.58*	0.38*	0.75*	0.71*	0.34	--

N = 183; alpha reliabilities are shown in brackets on the diagonal.

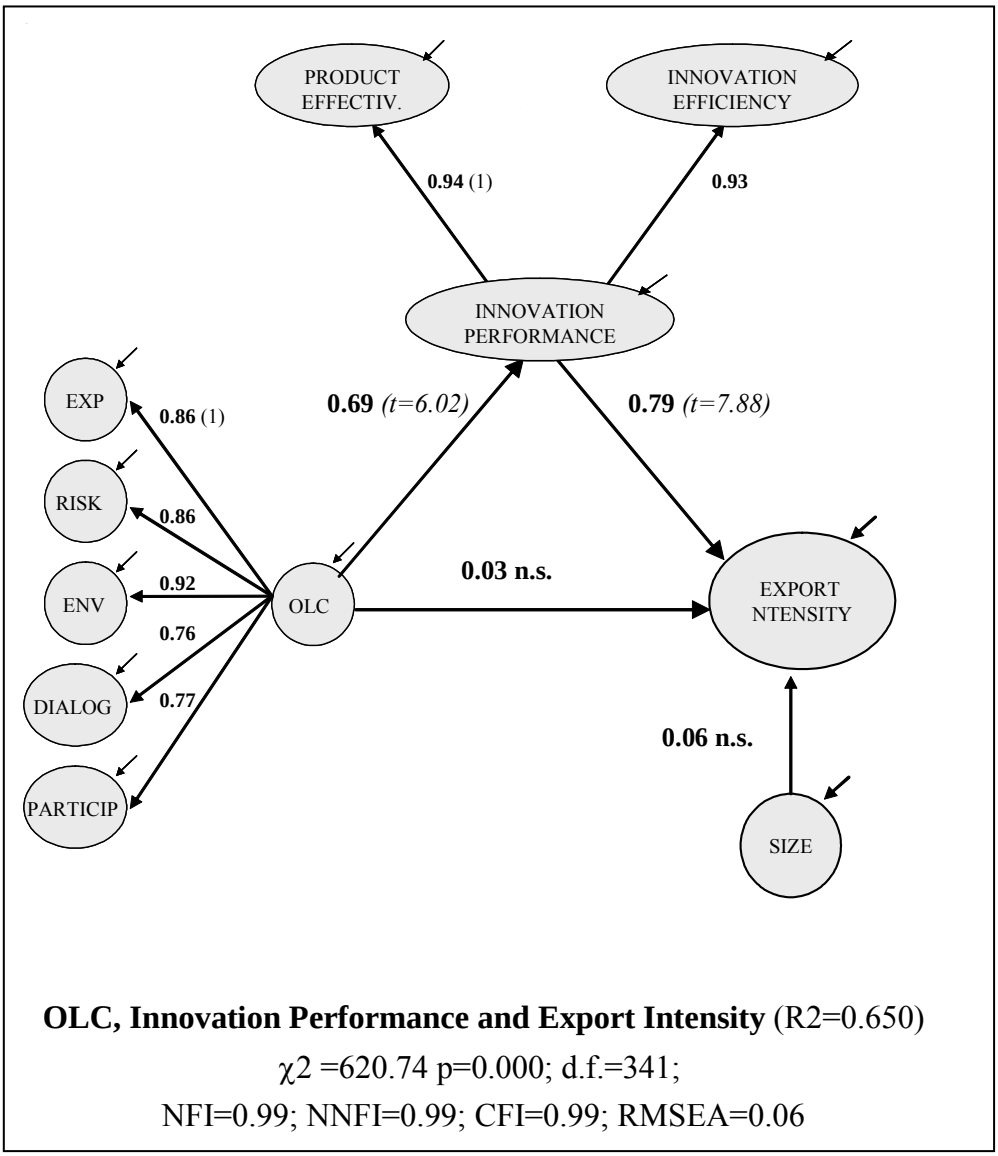
* Correlation is significant at the 0.01 level.

FIGURE 2: Direct effect model



(1) The parameter was equaled to 1 to fix the latent variable scale.
Parameters estimates are standardized with t-values shown in parentheses.

FIGURE 3: Partial mediation model



(1) The parameter was equaled to 1 to fix the latent variable scale.
Parameters estimates are standardized with t-values shown in parentheses.

APPENDIX: Questionnaire

Please assess the importance of the following items in your organisation.

Dimension	Item	Literature source
Experimentation	EX1. People here receive support and encouragement when presenting new ideas	Chiva et al. (2007)
	EX2. Initiative often receives a favourable response here so people feel encouraged to generate new ideas	
Risk taking	RK1. People are encouraged to take risks in this organisation	
	RK2. People here often venture into unknown territory.	
Interaction with the external environment	EN1. It is part of the work of all staff to collect, bring back, and report information about what is going on outside the company.	
	EN2. There are systems and procedures for receiving, collating and sharing information from outside the company.	
	EN3. People are encouraged to interact with the environment: competitors, customers, technological institutes, universities, suppliers etc.	
Dialogue	DG1. Employees are encouraged to communicate.	
	DG2. There is a free and open communication within my work group	
	DG3. Managers facilitate communication	
	DG4. Cross-functional teamwork is a common practice here.	
Participative decision making	PA1. Managers in this organisation frequently involve employees in important decisions	
	PA2. Policies are significantly influenced by the view of employees	
	PA3. People feel involved in main company decisions	

Please state your company performance compared to that of your competitors over the last three years with regard to the following items.

Dimension	Item	Literature source
Product innovation effectiveness	PT1. Replacement of products being phased out	OECD-EUROSTAT (1997), Alegre et al.. (2006)
	PT2. Extension of product range within main product field through new products	
	PT3. Extension of product range outside main product field	
	PT4. Development of environment-friendly products	
	PT5. Market share evolution	
	PT6. Opening of new markets abroad	
	PT7. Opening of new domestic target groups	
Product innovation efficiency	EF1. Average innovation project development time	Brown and Eisenhardt (1995); Barczak (1995); Alegre et al. (2006)
	EF2. Average number of innovation project working hours	
	EF3. Average cost per innovation project	
	EF4. Degree of overall satisfaction with innovation project efficiency	