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Environmental Orientation as a Determinant of Innovation Performance in Young SMEs

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ABSTRACT: The popular press, as well as most academic literature, claims that innovation activities are inherently linked to higher company performance. Successful innovations usually increase the firm's market scope or reduce costs, helping firms to obtain superior benefits. Therefore, most innovations are developed with those objectives in mind. Environmental orientation is defined as the managerial recognition of the significance of the impact a company has on the environment, and the need to minimize such impact. Nowadays, environmental motivation for innovation is becoming more and more common as firms are more aware of the consequences of their activities and attempt to be socially responsible. However, most literature on innovation is focused on R&D and on large mature firms, practically neglecting small and medium sized Enterprises –SMEs-, as does the literature on corporate social responsibility. In this paper, we focus on a sample of 1337 start-up SMEs less than 10 years old, from which we obtained information regarding their innovation activities. Our results show that in comparison to cost-oriented innovations, environmental orientation in the development of innovations increases performance.

Key words: Environmental orientation, Innovation, SMEs, Start-up

INTRODUCTION

Innovation is vital for companies to stay competitive and to successfully compete in changing markets. The popular press, as well as most academic literature, claims that innovation activities are inherently linked to higher company performance, and the determinants of innovation performance, that is, the magnitude of the economic returns of innovation, have attracted considerable academic interest. Successful innovations can help a company to obtain greater profits as they usually increase company market scope and/or reduce costs. Therefore, most innovations are developed with these objectives in mind. However, nowadays, firms are increasingly being pressured by stakeholders (clients, local communities, NGOs, etc.) who demand companies to address environmentally related concerns (Pirani and Secondi, 2011). This social awareness has led to greater private, public and political environmental pressure to maintain acceptable social conditions, giving rise to an increase in environmental regulation at all levels (national and supra-national). These demands are increasingly pressuring firms to orient their innovation activities towards the development of environmentally friendly products or services. Therefore, companies are now more environmentally oriented (Mondéjar-Jiménez *et al.*, 2010) and are increasing their investments in environmental issues (Vargas-Vargas, 2010). This environmental orientation can be defined as the managerial recognition of the significance of the impact a company has on the environment, and the need to minimize such impact.Nowadays, environmental motivation for innovation is becoming more and more common as firms are more aware of the consequences of their activities and try to be socially responsible through their Corporate Social Responsibility Programs –CSR-. However, most literature on innovation is focused on R&D and on large mature firms, practically neglecting small and medium sized enterprises, SMEs, as literature on CSR also does. SMEs have often been described as laggards (Revell and Rutherfoord, 2003) and early initiatives to stimulate environmental management among small firms proved ineffective (Friedman and Miles, 2002). These facts have led some authors to state that SMEs are lagging behind in developing environmentally friendly behaviour. Nonetheless, recent green initiatives among these companies have proliferated (Revell *et al.*, 2010) and a body of research on environmental management practices among SMEs is emerging (Hofmann *et al.*, 2012). Our paper aims to contribute to this emerging literature by focusing on

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young SMEs, a category of business practically neglected by the literature, and by analysing the effect of the environmental orientation of these firms on their innovation performance. The research question we aim to answer is the following:
What is the relative impact of environmental orientation of SMEs on their innovation performance?

Conventional wisdom and traditional literature on SMEs suggest that young and new firms have advantages in innovation (Acs and Audretsch, 1990) and as such, they are potential candidates to offer solutions to the new challenges of sustainability. Moreover, SMEs are more flexible and closer to consumer demands than larger firms. Therefore, they should be better able to respond to environmental challenges. However, very few studies address the innovation process of new ventures driven by environmental orientation (see Keskin *et al.*, 2012 for an exception) and SMEs are still rather reluctant to include environmental considerations in their practice. Nevertheless, there is a blunt contrast between the majority of environmentally inactive SMEs and a minority of innovative and dynamic SMEs who are leaders on environment. This justifies our research question.

Innovation strategy is fundamental to the success of innovation. In a highly competitive environment, the acquisition, maintenance and development of a firm's capacities to keep up with the pace of innovation are key to survival. These capacities depend on a firm's innovation objectives and the resultant innovation strategy (Burgelman *et al.*, 2004). A firm's innovation orientation guides it in adapting, integrating and reconfiguring its managerial and technological capabilities and resources endowment as appropriate for competing in a changing environment. Several studies have been carried out with respect to the relationship between innovation strategy and performance and investigating companies' perceptions of innovation strategies and their impact on organizational performance should be one of the most important tasks in survey-based innovation research (Guan *et al.*, 2009). Surveyed companies should be asked how they perceive the importance of various strategic orientations to innovation (OECD, 2005).

Following this argument and in order to answer our research question it has been necessary review the companies' motivations for innovation. Economic goals are the aims of business. The Neo-Classical Model revolves around the maximizing of the behaviour of individuals and companies in responding rationally to market-determined price signals. In this model, the goal of the firm is to maximize profits. Put more simply, economic profit is the difference between total income and total cost. Therefore, supra-normal profits could be achieved either by increasing total revenue or by decreasing total costs. The neo-classical framework clearly posits the profit incentive underlying company innovation (Langowitz, 1991). A market increase and/or a cost reduction would then be the main objectives of innovation. In a similar way, Schumpeter (1934) viewed innovation as the driving force of progress and development. He stated that a firm has incentives to innovate in order to capture increased profits as innovation provides a company with a continuous stream of temporary monopolies in a market. Therefore, traditionally, profit seeking and cost reductions would be the main motivations for firms to innovate.

However, as already mentioned, recent research is focusing on environmental orientation in companies, in accordance with the seminal work of Banerjee (2002). Most literature on the topic has tried to identify factors affecting environmental orientation adopted by firms such as industry characteristics (Peiró-Signes *et al.*, 2011), environmental policies (Garau *et al.*, 2011) or company goals among others (Mondéjar-Jiménez et al, 2013). Other research links environmental orientation with company strategy (Gázquez-Abad *et al.*, 2011), economic performance (Peiró-Signes *et al.*, 2013) and innovation (Petraru and Gavrilescu, 2010). Environmental orientation will focus firms towards innovative activities that add value for producers and consumers, while reducing environmental impact. Environmental orientation is proposed in this emerging literature as a key driver of innovation (Nidumulu *et al.*, 2009). Environmental innovations will improve the quality of the environment and will be better for society as a whole (Beise and Rennings, 2005). However, balancing sustainability objectives with the desire to make profits and be efficient is no simple task.

Environmental orientation in a company's innovation strategy is important because there is an increase in environmental regulation on national and supranational levels. One of the main reasons for SMEs to consider environmental issues is compliance with the law. Moreover, company face stakeholder pressure to address sustainability-related concerns. What is more, these environmentally oriented innovations can generate competitive advantage through more efficient production (Petraru and Gavrilescu, 2010), new business opportunities through product differentiation or even the opening of new markets (Gázquez-Abad *et al.*, 2011). Hence, innovation and environmental orientation are two concepts that have a separate impact on the firm's performance and that together act synergistically (Etsy and Winston, 2006). Additionally, recent research on large companies has found a positive relationship between environmental and social activities of the firms and their economic performance

(Menguc and Ozanne, 2005; Peiró-Signes *et al.*, 2013).Therefore, we expect that SMEs with an environmental orientation in their innovation strategy will develop successful innovations that will lead them to obtain better results. Following this argument we propose that:

H1: Young SMEs with an environmental orientation in their innovation activities will have a greater innovation performance.

Aiming for a parsimonious model, as well as innovation strategy orientation, we have introduced several control variables, discussed in prior research as relevant facilitators of innovation. We have introduced company characteristics and environmental measures, such as: company size, age, technology intensity of the industry and the type of innovation developed. Focusing on the latter, as well as classical technological innovation (product and process) we have also introduced management innovation (organizational and marketing) in our model.

Management innovation involves the introduction of novelty in an established firm and it can be defined as "the introduction of management practices that are new to the firm with the intention to enhance firm performance" (Mol and Birkinshaw, 2009 p. 1270). It has strategic and organizational change connotations and includes new managerial processes, practices or structures that change the nature of managerial work (Vaccaro, Jansen, Van Den Bosch and Volverda, 2012) comprising organizational innovation and marketing innovation. It represents one of the most important and sustainable sources of competitive advantage for firms (Wu, 2010). The approach taken in this study, within the literature of management innovation, is the rational perspective (Birkinshaw *et al.*, 2008), focusing on how management innovations deliver improvements in organizational effectiveness intended to further organizational goals.

MATERIALS & METHODS

Our sample consisted of 1337 start-up SMEs less than 10 years old, from which we obtained information regarding their innovation activities. Information was obtained from The Technological Innovation Panel (PITEC); a database which is compiled by the INE (The National Statistics Institute of Spain), FECYT (Spanish Foundation for Science and Technology) and COTEC (Foundation for Technological Innovation). The data provided by PITEC derives from the Central Business Directory (DIRCE) and the Research Business Directory (DIRID) and follows the Oslo Manual methodology (OECD, 2005) applied in the Community Innovation Survey (CIS) as reference to the selection of variables and indicators. This dataset has been used in recent research (e.g. Segarra-Oña *et al.*, 2011; Trigo and Vence, 2012).

Dependent variable (year 2009):

Innovation performance: Our dependent variable represents innovation performance. It is operationalized as the ratio of new product sales to total sales of the firm. New products are defined in our database as the market introduction of new or significantly improved goods or services with respect to capabilities, user friendliness, components or sub-systems. The shares of sales of new products and new services are direct monetary measures of the success of product and service innovations. New product sales are commonly thought to be a good indicator of market acceptance of a new product (Atuahene-Gima and Li, 2004). This measure includes innovations that are not patented but are employed in the production process. Although patents are good indicators of technological developments, they often do not reflect the economic value of these technologies (Wang and Kafouros, 2009).

Independent variables (period 2006-2008):

Following the literature, three control variables are included in the model. The size and age of the firm and the technology intensity of the industry in which it operates.

Size: Size is measured as the log of the number of employees. This variable is introduced to analyse the scale effects. Small companies' revenues are usually generated from a single product or a small number of products. As a result, most studies tend to report a negative association between innovation performance, measure as the percentage of innovative sales in total sales, and company size. We are aware of this bias in our database, comprising young SMEs.

Age: The age of the firm is measured as the year of creation of the firm. Literature on the relationship between the age of the firm and its innovation performance provides no consensus. A positive relationship may be expected considering an experience and "learning by doing" effect (Baldwin and Rafiquzzaman, 1998). However, if we expect younger firms to behave more proactively the opposite relationship may be seen (Acs and Audretsch, 1990).

Technology Intensity of the Environment. There is a sector-specific nature of innovation and firms in different industries show different patterns of innovation. Literature on innovation frequently uses sectorial classifications that highlight the characteristics of the process of technological change. The two major taxonomies for the study of sectorial patterns of innovation in manufacturing and service industries are Pavitt (1984) and Miozzo and Soete (2001) respectively. Typologies of manufacturing and service innovation are usually carried out separately.

In an attempt to combine manufacturing and service industries within the same framework and combining Pavitt's and Miozzo and Soete's classifications, Castellacci (2008) proposes a comprehensive taxonomy. Following Castellacci (2008) we included 8 sectorial group dummies in our model to capture the effect of sector characteristics related to life cycles and technological regimes on export propensity: Knowledge Intensive Business Services; Specialized Suppliers Manufacturing; Science-based Manufacturing; Scale-intensive Manufacturing; Network Infrastructure Services; Physical Infrastructure Services; Supplier-dominated Goods; and Supplier-dominated Services. The latter is the reference category.

Type of Innovation:
Product innovation is measured as a dummy variable that takes the value one when the firm has carried out product innovations during the period 2006-2008.
Process innovation is measured as a dummy variable that takes the value one when the firm has carried out process innovations during the period 2006-2008.
Organizational innovation: According to the Oslo Manual, "an organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organisation or external relations" (OECD, 2005, p.51). Following this definition and in line with recent work (Mothe and Thi, 2010), we included three variables to measure whether the firm had introduced new business practices for organizing work and procedures or changes to the organization of work such as management structure; whether it had implemented new or improved knowledge management systems and new methods of workplace organization for distributing responsibilities and decision-making; and whether it had introduced new or significant changes for organizing the relations with other firms or entities. All these variables are referred to the period 2006-2008. An exploratory factor analysis was conducted to reduce the number of variables and identify underlying dimensions. One single factor appears (Table 1). Factor scores are used in the regression analysis.

Firms innovate in order to be competitive. In doing so, they try to increase their profits, either by increasing their revenue or markets, or lowering their costs. However, there is an increase in environmental regulations as well as an external pressure from stakeholders who demand companies to address sustainability-related concerns. A firm's innovation strategy might be oriented towards an increase in its market share, factor 1, towards a decrease in its costs, factor 2, or towards environmental concerns, factor 3. The results of our empirical analysis support this triple objective (Table 1), the classic increase in market share, factor 1, and cost reduction, factor 2, objectives and environmental orientation, factor 3. Environmentally orientated firms develop their product and process innovations aiming to reduce materials and energy costs per unit output, minimize environmental impacts, improve health or safety or meet regulations or standards on environment, health or security.

Table 2 shows the results of our regression analysis. As expected, we found a significant, negative relationship between company size and its innovation performance, measured as the sales of new goods or services to total sales. Previous literature on the relationship between company size and innovation has found inconclusive results. Larger firms are considered more efficient innovators as they possess advantages in terms of scale, access to financial resources and private appropriation of income. On the other hand, smaller firms can be considered better innovators due to their more flexible nature. This lack of consensus and inconclusive empirical results may be explained by the relationship between size and innovation being contingent on the technological context where the firm operates (Revilla and Fernández, 2012). In our model, we have controlled for industry context, introducing dummy variables. Our results show a negative relationship between size and innovation performance (coef. -2.209; $p<0.01$) that might be explained by the fact that young SMEs usually have a reduced number of goods or services.

In line with the literature, we found no significant relationship between the age of the firm and its innovation performance. Our sample, consisting of SMEs less than 10 years old, yields little space for experience effects.

Regarding the type of innovation, product and marketing innovation seem to be types of innovations with stronger impact on performance (coef. 8.311 and 1.928 respectively; $p<0.01$ and $p<0.05$ respectively). When young SMEs introduce new products and/or introduce aesthetic changes in product design or packaging of goods or services, use new media or techniques for product promotion, and/or new methods for product placement or sales channels, this has a positive, significant effect on their innovation performance, measured as the sales of its innovative products to total sales (coef. 1.928; $p<0.05$).

Moreover, we found a slightly significant effect of organizational innovation on performance (coef. 1.592; $p<0.1$). When young SMEs introduce new business practices for organizing work and procedures or changes to the organization of work such as management structure; and/or implement new or improved knowledge management systems and new methods of workplace organization for distributing

Table 1. Results of factor analysis of research variables (Varimax rotation)

Organizational innovation activities of the firm in 2006-2008	**Factor AOrganizational Innovation**		
Changes to the organization of work such as management	.863		
structure	.856		
New or improved knowledge management systems	.766		
New or significant changes in the relations with other firms or entities			
Variance explained	68.82		
KMO	. 674		
Bartlett's	1386.81***		
Marketing innovation activities of the firm in the period 2006-2008	*Factor B Marketing Innovation*		
New or significantly changed product design or packaging	.683		
New promotion techniques	.812		
New methods for product positioning or distribution channels	.824		
New methods for fixing prices	.768		
Variance explained	59.84		
KMO	.763		
Bartlett's	1744.618***		
Innovation Strategy Orientation How important were each of the following objectives for your activities to develop innovations during the three years 2006-2008? Likert scale	*Factor 1 Market-orientation*	*Factor 2 Cost-orientation*	*Factor 3 Environmental-orientation*
Increase range of goods or services	.804		
Replace outdated products or processes	.538		
Enter new markets	.824		
Increase market share	.830		
Improve quality of goods or services	.718		
Improve flexibility for producing goods or services		.777	
Increase capacity for producing goods or services		.778	
Reduce labour costs per unit output		.772	
Reduce materials per unit output		.713	.449
Reduce energy costs per unit output		.664	.525
Reduce environmental impacts			.871
Improve health or safety			.859
Meet regulations or standards on environment, health or security			.846
Variance explained		70.811	
KMO		.892	
Bartlett's		10858.55***	

*** sig. 99%

responsibilities and decision-making, this has a positive impact on their innovation performance.

Finally, with respect to the effect of the firm's innovation-strategy orientation on performance, we found very interesting results. Firms that pursue an increase in their market share or range of goods or services have a positive and significant effect on their innovation performance (coef. 2.480; $p<0.01$), whereas we found no significant effect of those innovations orientated to reducing costs. Furthermore, the innovations aimed at the reduction of materials or energy costs per unit output, to reduce environmental impacts or simply to improve health or safety or to meet regulations or standards on environment, health or security, have a positive and significant effect on firm's sales (coef. 1.547; $p<0.05$). These results are consistent with recent literature on the effect of environmental orientation and economic performance (Peiró-Signes *et al.*, 2013).

CONCLUSION

This study investigates the links between innovation strategy and performance in a particular category of company, practically neglected by the existing literature and traditionally considered as laggards in terms of environmental concerns. This investigation aimed to explore the relationship and relative impact of environmental orientation on the innovation performance of young SMEs. Hierarchical regression analysis was applied and the results

Table 2. Hierarchical Regression Analysis (t value in parentheses)

	Innovation performance (2009)	
Variables (2006-2008 period)	Model 1	Model 2
Intercept	17.024***	14.732***
	(21.313)	(18.544)
Size	-2.209***	-3.648***
	(-2.603)	(-4.469)
Age (year of creation)	1.538*	1.197
	(1.929)	(1.597)
Industry:		
Knowledge Intensive Business Services	3.271***	2.561***
	(3.757)	(3.055)
Specialized Suppliers Manufacturing	.297	.064
	(.368)	(.084)
Science-based Manufacturing	2.618***	1.312*
	(3.213)	(1.701)
Scale-intensive Manufacturing	.862	.719
	(-.888)	(.930)
Network Infrastructure Services	-.948	-.867
	(-.797)	(-.867)
Physical Infrastructure Services	-.808	-1.188
	(-797)	(-1.246)
Supplier-dominated Goods	-2.011**	-1.319*
	(-2.382)	(-1.654)
Type of innovation		
Product innovation		8.311***
		(9.662)
Process innovation		-.239
		(-.281)
Organizational innovation		1.592*
		(1.862)
Marketing innovation		1.928**
		(2.413)
Innovation strategy:		
Market-orientation		2.480***
		(2.998)
Cost-orientation		1.307
		(1.640)
Environmental-orientation		1.547**
		(1.995)
Adj. R^2	0.038	0.163
F	5.169***	
Increase in R^2		0.126
Increase in FN (1337)		28.293***

***sig. 99%; **sig. 95%; *sig. 90%. All VIF are below 1.403

empirically supported the theoretical assertions made in the study. There was found to be statistically significant relationships between innovation performance and several independent factors such as the type of innovation and the innovation strategy orientation. This study reflects the current process by which environmental concerns are being integrated into the conventional innovation paradigm.

Environmental orientation in young SMEs is assessed in this paper on the basis of environmental and social goals. Environmentally oriented firms develop their product and process innovations aiming to reduce materials and energy costs per unit output, minimize environmental impacts, improve health or safety or meet regulations or standards on environment, health or security. This focus on environmental innovations leads them to obtain better innovation performance. Furthermore, when this motivation in emphasised in product and marketing innovations, performance increases. This orientation

enters the core of the companies' business activities as they introduce market innovations driving sustainable development. These innovations can reach the mass market and generate greater profits. In practical terms, this study reminds managers of the importance of nurturing a pro-environmental orientation in their innovation strategy and improving their sensitivity to stakeholders´ environmental demands. Traditionally, SMEs mainly considered environmental issues in order to comply with the law. However, our research shows that an environmentally-oriented innovation strategy helps these firms to improve their profitability.Despite the academic and practical implications that can be derived from our research, the focus on a particular type of firm - young SMEs operating in Spain - , may restrict the extent to which the findings may be generalized.

The relatively small variance explained by our model suggests that there are some other factors that explain innovation performance in young SMEs. Future research should incorporate other strategic variables such as the firm's distribution of its R&D budget so as better understand this issue. Moreover, although we time-lagged our dependent variable, future research using longitudinal research design may shed light on the causal relationship between environmental orientation and innovation performance.

Environmental awareness and stake-holder pressure lead young SMEs to have an environmental orientation in their innovation activities. This paper demonstrates the positive effect of this orientation on companies' innovation performance. As Ferrari et al (2010) recently showed entrepreneurial response to environmental issues differs according to the type of entrepreneur. Therefore, future research may analyse whether different degrees of environmental orientation might have diverse effects on performance, depending on the management style or how these or other factors might moderate the relationship between environmental orientation and innovation performance.

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