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Conference Paper

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50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Beneyto, Maria Jesus Santa Maria; Pérez, José Miguel Giner (2010) : The Industrial District's Influence on the Innovative Process: The Case of the Spanish Plastics Industry, 50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/118914>

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THE INDUSTRIAL DISTRICT'S INFLUENCE ON THE INNOVATIVE PROCESS: THE CASE OF THE SPANISH PLASTICS INDUSTRY*

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Since the end of the 1980s, several studies on industrial districts have indicated that being located in specialist industrial complexes helps to foster business competitiveness and economic development in areas of this kind. More recent studies have been aimed at highlighting the capacity for innovation in these areas, where the proximity of related industries helps to generate and spread knowledge. Specifically, characteristics such as the industrial atmosphere, increased relations between businesses and with local institutions, and the processes of competition and co-operation give access to specific knowledge that can strengthen innovation. In the case of the plastics industry, the high levels of competition and the versatility and the possibilities of adapting to multiple sectors force companies to make considerable efforts to be innovative and open to new business opportunities.

The industry of transforming plastic materials in Spain consists of numerous small companies that in many cases are clustered together in certain parts of the country. As well as being based in certain provinces, particularly Catalonia and the Region of Valencia, which between them account for 50 per cent of all businesses in the sector. A high concentration is also observed in other areas, leading to the formation of systems of small companies specialised in the manufacture of plastic products. Several studies have shown how the capacity for innovation of small businesses is linked to the external relations that these firms have with other companies and institutions located nearby. Specifically, the theory about industrial districts states how in these kinds of territorial systems of small businesses a series of competitive advantages are obtained as a result of the characteristics external economies of this model of productive organisation. These external economies are the result of concentrated production organisation, interconnectivity between businesses and with agents and institutions in the area and from the social environments in which these activities operate. The advantages of working in such a district include those linked to innovation as the result of accumulating a

* This research was made possible thanks to information provided by the Plastics Market Observatory of the Plastics Technology Institute, which our research group contributed to design and implement.

specialist workforce and the speed at which information spreads and the competitive dynamic of the area, which leads companies to develop innovative processes. The proximity of small businesses producing similar products helps innovations to spread quickly. There is strong competition between companies, and this pushes them to follow those that introduce improvements, and the quick spread of innovations makes businesses ensure that they are informed about new technologies or the elements that they consist of.

The purpose of this paper is to analyse the characteristics of innovative companies in the plastics transformation industry in Spain and to determine whether belonging to an industrial district helps the processes of innovation by strengthening companies' capacity for innovation. The results of a survey administered to companies in this industry in Spain are analysed. This empirical analysis is aimed at providing evidence on the impact that having specialised companies agglomerated in a single area can have on the capacity for innovation.

The paper is structured as follows: the first section presents the industrial district as a model of both industrial and territorial organisation, and the effects that the industrial district can have on the innovative capacities of businesses. The second section analyses innovative companies in Spain's plastics transformation sector. Specifically, the analysis focuses on the possible differences in the features of plastics transformation companies in terms of whether or not they are innovative.

The third section analyses whether being located in a specific district and belonging to an area of specialist production has any effect on the probability of introducing innovations. It also seeks to determine the effects on innovation of another series of variables such as the size of the business, age, location, belonging to a business group or not, target markets, target sector for its products and co-operation agreements with other companies. Econometric analysis examines the impact on innovation of belonging to an industrial district and certain characteristics of the structure and operation of companies in the plastics transformation sector.

1. The industrial district and its effect on the innovative capacities of businesses

Industrial districts date back to the early 20th century and an analysis by Alfred Marshall showing that the advantages of large-scale production can be achieved by a population of small businesses based in a specific location, subdivided into production stages and drawing on a single local workforce (Marshall, 1982). This analysis argues that the success of a national

economy depends at least in part on the localised development concentrated specialised industries. The figure of the industrial district was recovered in the 1980s by various researchers, mainly based on analysis by Becattini on the polarised location of small industrial companies in Italy. In Becattini's understanding of the industrial district (1979, 1989, 1992) which was complemented by other authors such as Bellandi (1986), Sforzi (1987, 1989, 1992), Brusco (1992), Triglia (1993), Signorini (1994) and Dei Ottati, G. (1995), the idea of the Marshallian industrial district reappears, cementing the notions of external economies and economies of agglomeration. These are generated as a result of interactions and exchanges between small businesses that form part of the local production fabric, the supply of qualified labour, and the availability of services needed to improve productivity and competitiveness of the companies concerned. This set of factors help local companies to reach a collective efficiency that can be defined as a comparative advantage resulting from external economies and joint actions (Rabellotti and Schmitz, 1999; Rabellotti et al., 2009).

On the other hand, the traditional literature on industrial districts has pointed out that innovation in products and processes in industrial districts is helped by technological externalities that are developed among the numerous specialist companies that are concentrated in the same area. Particular attention has been paid to the levels of knowledge that tacitly spreads throughout the district and which helps ideas and information to be transmitted and exchanged, workers to move between the different companies in the district and the intensity of relationships between businesses and suppliers. Competition and rivalry between companies also pushes businesses to be more innovative. The gains achieved in productivity spread outwards by the effect of accumulated positive externalities that are generated in these areas.

In an industrial district, companies achieve technological improvements and increased competitiveness through the links that are made on the market and the possibilities of generating co-operation agreements as a result of companies' geographic proximity. Specifically, various authors indicate how it is much more difficult for new tacit knowledge to spread over large distances (Storper and Harrison, 1991; Cooke et al., 1997). On the other hand, interaction and collaboration benefit from the trust that is generated through personal relationships resulting from interaction at close quarters. Along the same lines, proximity has been shown to reduce communication costs and can improve the quality of interpersonal relationships.

Interaction with suppliers, clients, business associations and public agencies can also provide external inputs in the learning process that the company would not be able to obtain on its own. This interaction can help information (particularly technological information) or markets to be shared and thus obtain inputs that complement the internal learning process (Rothwell and Dodgson, 1991; Lundvall, 1988; Freeman, 1991, 1995).

Being located in industrial districts gives companies access to specific knowledge, which fosters the processes of both competition and co-operation between local businesses, and gives an added stimulus to innovate. The possibility of obtaining information and other inputs outside the company is a key determinant for innovation in small businesses (De Propis, 2000; Freel, 2000, 2006; Romijn and Albaladejo, 2002). This advantage is provided in large part by what Marshall called “industrial atmosphere”, i.e. the set of intangible elements that are found in that space, such as the entrepreneurial spirit, relationships between companies, local technical knowledge on typical production processes in the production system, and the availability of specialised labour, which helps knowledge to spread in the area, influencing competitiveness and helping innovation to develop.

Contextual tacit knowledge, which exists within the area and which is not available to any companies outside the area, is an advantage for businesses located in the area. This type of knowledge, which is closely linked to the main business activity and its time-related, social and spatial “context”, is hard to reproduce over distance, outside the original cultural context (Becattini, 2005). Externalities linked to training and the existence of a local specialised workforce that is able to quickly absorb technical changes and adapt to rapid changes in demand are also a considerable advantage.

This is the model of innovation, then, with which to compare a more traditional alternative in which knowledge is mainly produced through internal research and access to sources of external knowledge such as research centres and institutions. Differences therefore exist between the innovation model in industrial districts and the predominant model of businesses located outside industrial districts.

Despite the fact that there is a large body of theory literature that theorises on innovation in industrial districts, there is a limited number of empirical studies that have measured the effects of such districts on the capacity for innovation. There are some studies that have approached the issue, such as those by Brusco (1975), Russo (1996), Molina (2002), Cainelli and De Liso (2005), Muscio (2006), Galetto (2008), Boix and Galletto (2009), and Lazzeretti

and Capone (2009), with results that support the theory of the positive effects that occur in industrial districts on innovative processes in companies located in such areas. Along these lines, this study analyses the effects on being located in an industrial district on the capacity for innovation of plastics transformation companies in Spain.

2. Analysis of the plastics transformation industry in Spain based on innovative activity

There are various reasons for analysing the factors that affect the innovative processes in companies in Spain's plastics transformation sector. On the one hand, the sector is a large one within Spanish industry as a whole. Specifically, the manufacture of plastic products represents 2.53% of total turnover in industry in 2008, with a total of €15,924 million. In 2008 a total of 85,922 workers were employed in the sector, representing 3.4% of Spain's total industrial workforce. The sector is made up of 5,543 companies, most of which are based in Catalonia and the Region of Valencia, with half total turnover, followed by Madrid, Andalusia and the Basque Country.

There is also no doubt that plastic is one of the most versatile of materials, and its very adaptability is one of the factors that justify having expectations for the industry to grow. The highly competitive plastics market and its versatility and possibilities for adapting to multiple sectors are currently forcing European companies to make considerable efforts to be innovative and open to new business opportunities. The manufacture of plastic products has played a key role in the technological development of modern economies, as its use has increased in products relating to telecommunications (computers, fibre optics, telephones, etc.) and means of transport (rise of plastic products used in the manufacture of cars and aircraft). At the same time as the sector's technological capacity to develop new products and plastic materials has increased, it has also looked for ways to increase the level of recycling of these products by making their use environmentally friendly.

Thus, this sector produces plastic products for a wide range of production sectors or directly as finished products. The variety of products that can include these polymers is so high that it covers nearly all existing sectors or areas of economic activity. All these production sectors benefit from the innovations and advances that are made in the plastics sector. By introducing new technologies and innovation, production efficiency can be improved, performance enhanced, costs and energy consumption reduced, prices lowered for end products, the quality

of products increased or a trend pursued of making things smaller, which in turn opens the door to new applications.

The following section analyses the main characteristics and operations of the companies that comprise Spain's plastics transformation industry. Specifically, the study carried out aims to determine whether the innovative companies in the sector have any differentiating characteristics compared with other companies that do not innovate. Using data from a survey conducted in 2009, information was obtained on the general characteristics of the companies, such as their size, age and turnover. Other aspects considered were with regard to how each company was run, in terms of purchasing raw materials, target markets for products (local, national and international) and the target sectors of these products. Finally, the characteristics of the companies are analysed with regard to their innovation, by analysing the investment made by each company, the target of the investment, the introduction of new elements in the company and the methods used to protect innovation.

The aim of the analysis is to determine the main characteristics and activities of the company, based on whether or not it carries out any kind of innovation. To do this, a difference was made between businesses that reported having introduced some kind of innovation in 2008 and those that report no such innovation during that time.

Firstly, this shows that innovative companies have an average age slightly higher than those that do not innovate (table 1), although the difference is of very little significance. Regarding the size of the businesses, it can be observed that innovative companies are larger. Specifically, these companies have an average number of 39 workers, whereas companies that do not innovate have an average of 22.5 workers.

In innovative companies, the percentage comprising the sale of products manufactured by other companies is lower than that reported by firms that do not innovate (table 1).

The average turnover of innovative companies is higher than that obtained by non-innovative businesses (table 1). On the other hand, it can be observed how innovative businesses expect to record growth rates for 2009 that are negative, but on average lower than the forecasts for non-innovative companies. Specifically, a high percentage of innovative companies expect to record a negative turnover rate of more than 5% (table 2). However, a relationship can be observed between the forecast of obtaining a higher rate of positive turnover and the company being involved in innovative activities. The percentages of companies that forecast between 5% and 10% and those expecting to exceed 10% are much higher for innovative businesses.

With regard to the main input of plastics transformation companies, namely the plastic itself, its cost within the overall production costs is higher in innovative businesses. Plastic represents more than 50% of production cost in companies with some kind of innovation, and 45% in those that do not innovate.

On the other hand, innovative firms purchase more plastic from outside Spain than non-innovative companies do. Specifically, a statistically significant relationship is observed between a company being innovative and the percentage of plastic purchased in EU countries (outside Spain). This percentage is 21.2% of all purchases made by innovative companies, and only 5.7% for companies that do not innovate (table 3).

Sales figures in regions of Spain beyond where a company is located are higher among innovative companies. Specifically, 40% of sales by innovative companies are in Spain but outside their particular autonomous region, compared with 25% for non-innovative companies (table 3). A statistically significant relationship therefore exists between a greater percentage of sales in local markets and a lack of innovation. Innovative companies are also more prone to export than companies that do not innovate. A statistically significant relationship is observed between a company being innovative and a larger amount of sales in EU countries. Thus, for innovative companies, sales in the EU make up 15% of the total, whereas for businesses that are not innovative the figure is only 3.2%.

With regard to the sector that receives most of their products, firms that are not innovative target higher percentages of their sales to the agriculture, automotive, food packaging and land transport sectors. Innovative companies focus their sales to a greater extent on the food packaging sector, other packaging, the automotive industry and construction.

In terms of what factors are considered to affect their development and success, innovative companies place greater emphasis on developing new products.

Analysis of the investment made in 2008 shows much higher figures for innovative companies (table 4). This shows a statistically significant relationship between companies that innovate and a greater proportion of turnover devoted to investment. Specifically, 25.8% of innovative companies report between 1% and 5% of turnover going back into investment, compared with only 11.5% of companies that do not innovate. A total of 30.6% of innovative companies reinvest more than 5% of their turnover, compared with 19.2% of businesses that do not innovate (table 5). This relationship between innovative companies and investment of turnover is a statistically significant figure. It can be observed, then, that innovative

companies make higher levels of investment and expect greater results in their turnover for 2009.

As for where investment is made, innovative businesses devote a higher percentage to RDI (26.2%). Innovative companies also devote a high percentage of their investment to new markets (table 4).

Analysis of how companies rate the factors that can hinder innovation shows how few differences are reported in terms of whether the company innovates or not (table 4). The only factor rated differently (and that is statistically significant) is the lack of information about technology, which is rated more highly by companies that are not innovative.

It is also observed that 73% of the innovative companies have incorporated a new product into their business, and 42.4% report having placed a new product on the market (table 6). It can also be observed that 18.2% of companies have introduced an innovation in service for their business, whereas only 1.5% report having introduced an innovation in service for the market. A total of 27.3% of the innovative companies report having introduced an innovation in management for their business, whereas 1.5% report having introduced an innovation in management for the market. Approximately 44% of the companies report having introduced an innovation into the production process for their businesses. This percentage drops to 12.1% for companies that report having introduced an innovation into the production process for their businesses.

With regard to protecting innovations developed by the companies, 16.7% of all the innovative firms report having used the product's brand as a method of protection (table 7). The same percentage of companies reports having used the trade secret method to protect their innovations.

In terms of the strategies that companies plan to use, 50% of the innovative businesses expect to use or increase their use of alternative plastic materials (table 8). This percentage is much higher than that recorded for companies that do not innovate (15.4%). More than half of the innovative companies (51.5%) also expect to expand their target markets, compared with 30.8% for non-innovative companies. Finally, 42.4% of all the innovative companies plan to introduce new manufacturing processes, a figure that again is much higher than that recorded for businesses without innovation (15.4%). In short, innovative companies forecast developing business strategies to improve their market position to a greater extent than

companies that do not innovate, by increasing their use of alternative plastic materials, increasing the range of markets for their products or introducing new production processes.

Finally, the measures that the companies plan to adopt to deal with the economic crises and the results thereof were analysed, revealing that 13.6% of the innovative companies plan to increase their RDI investment for new products and to introduce new services (table 9). By contrast, none of the companies that do not innovate planned to invest in RDI as a response to the situation resulting from the economic crisis. A total of 15.2% of the innovative companies report seeking extra funding from the financial system as a measure to adopt, and 10.6% of these businesses report that they will not take on any of the new staff that they had planned to. Reducing general business costs is the measure which the highest percentage of companies plans to adopt to deal with the economic situation resulting from the current crisis.

3. The effects on being located in an industrial district on the capacity for innovation of plastics transformation companies

This section examines whether being located in an industrial district has a positive effect on the capacity for business innovation, making an empirical contribution that supports the results shown in other studies on the effect that industrial clusters and districts have on innovation (Audretsch and Feldman, 1996; Baptista, 2000, Beaudry and Breschi, 2001; Cainelli et al., 2000; Muscio, 2006). These works state that industrial districts provide companies with specific local knowledge that is continuously renewed through a process of communication and dissemination that produces spillovers of local knowledge. In industrial districts, access to specific knowledge that is disseminated throughout the area but which is not made available to businesses located in other areas, and the informal spread of knowledge on the innovative activities of local competition, stimulates companies to improve their production processes on an ongoing basis and to ensure that they are up to date technologically, with increased efforts to innovate (Muscio, 2006).

Logistic regression is used to identify the variables that may have a positive (or negative) influence on the company innovating or not, including whether or not the company is located in an industrial district. Also considered is whether the business is located in an industrial district that is specialised in the firm's main client sectors.

The analysis of companies by their location in industrial districts uses the areas identified by Boix and Gelletto (2004, 2006). From the data available, it can be observed that of the

companies analysed, many of them are located in industrial districts. A statistically significant difference is also observed with regard to whether the company is innovative or not, and whether or not it is based in an industrial district. Specifically, it can be observed that companies that are not innovative are mainly located in areas that are not classed as industrial districts. Furthermore, of all the companies located in industrial districts, approximately 80% are innovative businesses (table 10).

As well as using the variable of being located in an industrial district, the econometric analysis used here also aims to determine the effects of another series of variables on the innovative nature of companies (table 11): the size of the company (staff numbers), age, belonging to a business group or not, target markets, target sector for its products, strategic business factors and co-operation agreements with other companies. The aim, therefore, is to determine the impact of belonging to an industrial district and of certain characteristics of the structure and operation of companies in the plastics transformation sector.

The variable is of a binary nature (1 = innovative company; 0 = non-innovative company). The potential explanatory variables considered are those which, in line with the review made of the literature, could explain the companies' innovative nature (table 11).

Table 12 presents the results of these estimates. Considering the binary nature of the dependent variable, estimates were made using a logistic model ("logit"). Using an alternative "probit" model leads to very similar results. Various simulations were conducted to choose designs of models with the greatest predictive capacity, with suitable partial significance (estimated coefficient) and (overall) goodness of fit of the model.

A model was estimated first without including the territorial aspect (model 1). The results of this model (table 12) show what a positive influence employment, the importance of local and regional purchasing, the varied range of products as a strategic option and agreements regarding production have on the innovative nature of companies. It can also be observed how links to a series of client sectors (agriculture, other land transport, toys and leisure), the relevance of certain strategic dimensions (negotiating power with clients, access to funding), co-operation in purchasing and logistics have a negative influence on the probability of a company being innovative. Model 1 shows a high predictive power at a global level (94.2% of subjects correctly predicted) and in the subset of innovative (98%) and non-innovative (83.3%) businesses.

Models 2 and 3 incorporate the company being located in an industrial district, as identified by Boix and Galletto (2004, 2006), as a possible variable to explain the probability of a company being innovative. In model 2, the fact that a company is located in an industrial district is considered as an explanatory variable, regardless of the specialisation. The results obtained (table 12) for model 2 show how the fact that a company is located in an industrial district has a positive effect (positive and significant estimated coefficient) on the innovative nature of companies, as occurs with the other variables (stability can be observed in the value and significance of the estimated coefficients). One positive aspect is that including being located in an industrial district improves the model's predictive power. Regarding the variable of being located in an industrial district with a specialisation similar to the company's main sales sectors (model 3), it can be observed how the estimated coefficient is positive (but not significant) and does not improve the model's predictive capacity.

Table 1. Characteristics of firms

	Non-innovative firm	Innovative firm	Total			
	Mean	Mean	Mean	F	Sig.	
Age	19,0	21,8	21,0	0,742	0,391	
Turnover	3572595,4	6842068,1	5950393,7	2,020	0,159	
Expected growth rate 2009	-5,6	-1,7	-2,7	0,391	0,533	
Distribution activity as % of turnover	40,0	32,9	34,9	0,208	0,652	
Number of employees 31/12/2008	22,5	39,1	34,4	1,988	0,162	

Source: Authors' elaboration.

Table 2. Firms by turnover growth rate

	Non-innovative firm		Innovative firm		Total	
< -5%	7	31,8%	25	41,0%	32	38,6%
-5% to 0%	6	27,3%	6	9,8%	12	14,5%
0% to 5%	6	27,3%	11	18,0%	17	20,5%
5% to 10%	1	4,5%	10	16,4%	11	13,2%
> 10%	2	9,1%	9	14,8%	11	13,2%
Total	22	100,0%	61	100,0%	83	100,0%

Note: Pearson's chi-square test, Sig <0,1

Source: Authors' elaboration.

Table 3. Commercial variables of firms

	Non-innovative firm	Innovative firm	Total			
	Mean	Mean	Mean	F	Sig.	
Purchasing activity						
Plastic material as % of production cost	42,1	50,3	48,0	2,751	0,101	
Local purchases of plastic material as % of plastic material total purchases	17,9	11,0	13,0	1,065	0,305	
Rest of regional market purchases of plastic material as % of plastic material total purchases	10,8	13,8	12,9	0,268	0,606	
Rest of Spain purchases of plastic material as % of plastic material total purchases	50,1	48,7	49,1	0,021	0,885	
EU purchases of plastic material as % of plastic material total purchases	5,7	21,2	16,7	5,029	0,027	**
Rest of the world purchases of plastic material as % of plastic material total purchases	0,2	4,6	3,3	2,040	0,157	
Sales						
Local sales (%)	34,0	22,3	25,6	2,603	0,110	
Rest of regional market sales (%)	15,1	14,0	14,3	0,062	0,804	

	Non-innovative firm	Innovative firm	Total			
	Mean	Mean	Mean	F	Sig.	
Rest of Spain sales (%)	24,9	39,3	35,2	4,704	0,033	**
EU sales (%)	3,2	15,1	11,8	8,865	0,004	***
Rest of the world sales (%)	3,9	4,6	4,4	0,059	0,808	
Sales by sector destination						
Agriculture (%)	16,4	8,8	10,9	1,756	0,188	
Automotive industry (%)	12,4	11,9	12,1	0,006	0,938	
Others terrestrial transports sector (%)	7,9	0,4	2,5	7,100	0,009	***
Footwear and textiles (%)	0,2	1,8	1,3	1,373	0,244	
Construction (%)	2,7	10,6	8,4	3,688	0,058	*
Electrical/electronic (%)	4,6	1,5	2,3	2,696	0,104	
Domestic electrical appliance (%)	1,3	3,4	2,8	0,689	0,409	
Renewable energy sources (%)	0,6	0,0	0,2	5,163	0,025	**
Food product packaging (%)	11,0	19,8	17,3	1,574	0,213	
Rest of packaging (%)	7,1	11,7	10,4	0,640	0,426	
Hygienic-sanitary (%)	6,2	5,1	5,4	0,075	0,785	
Toys and leisure (%)	4,2	2,1	2,7	0,430	0,513	
Household goods (%)	5,4	4,3	4,6	0,138	0,711	
Factors relating to the firm' successful and development (scale 1 -5)						
Importance of availability and quality supply of materials	4,1	4,0	4,0	0,309	0,580	
Importance of negotiation power with the clients	3,9	3,8	3,8	0,255	0,615	
Importance of better quality/cost rate	4,3	4,2	4,2	0,510	0,477	
Importance of quality certification	3,0	3,1	3,1	0,075	0,785	
Importance of R&D activity	2,8	3,3	3,2	2,558	0,114	
Importance of firm image	4,2	3,9	4,0	1,697	0,196	
Importance of specialized products	3,5	3,9	3,8	1,925	0,169	
Importance of new products development	3,4	3,9	3,7	3,009	0,087	*
Importance of environmental factors	2,6	2,9	2,8	1,217	0,273	
Importance of financing access	3,9	3,5	3,6	1,474	0,228	
Importance of commercial promotion	3,2	3,4	3,3	0,609	0,437	
Importance of wide variety of products	3,4	3,6	3,5	0,393	0,533	
Importance of trained workforce	3,0	3,0	3,0	0,002	0,964	

Note: Mean differences test, (*) Sig <0,1, (**) Sig <0,05, (***) Sig<0,001

Source: Authors' elaboration.

Table 4. Investment and innovation variables of firms

	Non-innovative firm	Innovative firm	Total			
	Mean	Mean	Mean	F	Sig.	
Investment						
Investment in 2008	47890,4	195727,0	152538,8	2,442	0,122	
Investment to increase/updating productive capacity as % of total investment	37,5	33,6	34,7	0,178	0,674	
Investment to R&D activity as % of total investment	5,0	26,2	20,2	9,340	0,003	***
Investment to training workforce as % of total investment	2,8	2,6	2,7	0,022	0,883	
Investment to new markets as % of total investment	2,5	11,1	8,6	3,488	0,065	*
Investment to environmental issues as % of total investment	0,3	4,2	3,1	1,571	0,213	
Factors to make innovation difficult (assessment 1-5)						
High economic risks	4,4	4,0	4,1	2,303	0,133	
High Innovation costs	4,3	4,2	4,2	0,822	0,367	
Lack of financing sources	4,2	4,0	4,0	0,685	0,410	
Lack of trained staff	3,6	3,1	3,2	2,562	0,114	
Lack of technological information	3,5	3,0	3,1	3,089	0,083	*
Lack of information about products or markets	3,4	3,2	3,2	1,180	0,281	
Lack of support to innovation propositions	4,0	3,5	3,6	2,581	0,112	
Bureaucracy requirement	4,0	3,8	3,8	0,674	0,414	
People don't want new things	2,7	2,5	2,5	0,238	0,627	

Note: Mean differences test, (*) Sig <0,1, (**) Sig <0,05, (***) Sig<0,001

Source: Authors' elaboration.

Table 5. Firms by investment as % of turnover rate

	Non-innovative firm		Innovative firm		Total	
0%	15	57,7%	18	29,0%	33	37,5%
0% to 1%	3	11,5%	9	14,5%	12	13,6%
1% to 5%	3	11,5%	16	25,8%	19	21,6%
> 5%	5	19,2%	19	30,6%	24	27,3%
Total	26	100,0%	62	100,0%	88	100,0%

Note: Pearson's chi-square test, Sig <0,1

Source: Authors' elaboration.

Table 6. Typology of innovation

		N° cases	%
New product to the firm ***	No	18	27,30%
	Yes	34	72,70%
New product to the market ***	No	38	57,60%
	Yes	28	42,40%
New service to the firm **	No	54	81,80%
	Yes	12	18,20%
New service to the market	No	65	98,50%
	Yes	1	1,50%
New management methods to the firm ***	No	48	72,70%
	Yes	18	27,30%
New management methods to the market	No	65	98,50%
	Yes	1	1,50%
New production methods to the firm ***	No	37	56,10%
	Yes	29	43,90%
New production methods to the market *	No	58	87,90%
	Yes	8	12,10%
Total		66	100,0%

Note: Pearson's chi-square test, (*) Sig <0,1, (**) Sig <0,05, (***) Sig<0,001

Source: Authors' elaboration.

Table 7. Protection methods to the innovations

		Non-innovative firm		Innovative firm		Total	
Product brand	No	25	96,2%	55	83,3%	80	87,0%
	Yes	1	3,8%	11	16,7%	12	13,0%
Factory secret	No	25	96,2%	55	83,3%	80	87,0%
	Yes	1	3,8%	11	16,7%	12	13,0%
Total		26	100,0%	66	100,0%	92	100,0%

Note: Pearson's chi-square test, Sig <0,1

Source: Authors' elaboration.

Table 8. Forecast of realizing new managerial strategies

		Non-innovative firm		Innovative firm		Total	
Increase the use of plastic alternative materials ***	No	22	84,6%	33	50,0%	55	59,8%
	Yes	4	15,4%	33	50,0%	37	40,2%
Introduce new production processes **	No	22	84,6%	38	57,6%	60	65,2%
	Yes	4	15,4%	28	42,4%	32	34,8%
Extend the destination markets *	No	18	69,2%	32	48,5%	50	54,3%
	Yes	8	30,8%	34	51,5%	42	45,7%
Total		26	100,0%	66	100,0%	92	100,0%

Note: Pearson's chi-square test, (*) Sig <0,1, (**) Sig <0,05, (***) Sig<0,001

Source: Authors' elaboration.

Table 9. Measures against the economic crisis

	Non-innovative firm		Innovative firm		Total	
The product demand will not meet affected	0	0,0%	4	6,1%	4	4,3%
Not new employments	0	0,0%	7	10,6%	7	7,6%
Reduction of personnel to cut expenses	1	3,8%	5	7,6%	6	6,5%
Reduction of general expenses	14	53,8%	20	30,3%	34	37,0%
Search of extra-financing in banks (credits)	4	15,4%	10	15,2%	14	15,2%
Reduction of the plan of expansion (national or international)	1	3,8%	3	4,5%	4	4,3%
Increase of the investment in R+D+i (new products / services)	0	0,0%	9	13,6%	9	9,8%
Cessation of activity	1	3,8%	1	1,5%	2	2,2%
Commercial alliances with other companies	2	7,7%	2	3,0%	4	4,3%
Others	3	11,5%	5	7,6%	8	8,7%
Total	26	100,0%	66	100,0%	92	100,0%

Note: Pearson's chi-square test, Sig <0,1

Source: Authors' elaboration.

Table 10. Location in Industrial Districts (ID)

		Non-innovative firm			Innovative firm			Total	
		Nº	%/total column	%/total file	Nº	%/total column	%/total file	Nº	%/total column
ID	No	17	65,4%	34,69%	32	48,5%	65,31%	49	53,3%
	Yes	9	34,6%	20,93%	34	51,5%	79,07%	43	46,7%
Total		26	100,0%	28,26%	66	100,0%	71,74%	92	100,0%

Note: Pearson's chi-square test, Sig <0,1

Source: Authors' elaboration.

Table 11. Explanatory variables of the innovation considered in the estimated models

	Explanatory variables	Description	Type
Characteristics of firms	Age	Years of firms life	Interval (1-62)
	Employment	Employment (2008)	Interval (1-315)
	Group	Belonging to a business group	Binary (0,1)
	Growth_Tur_e09	Growth estimated in the turnover (2009)	Interval (-70-100)
	Crm_Tc	Cost of the raw materials on the total cost (%)	Interval (0-100)
	Tur_invest	Investment as % of turnover rate (2008)	Interval (0-100)
	Especif_product	Production of specific products	Binary (0,1)
Market (spatial scope)	Reg_purchases	Regional market purchases (%)	Interval (0-100)
	Ext_sales	Sales to exterior markets (%)	Interval (0-100)
Sales by	SC1	Agriculture (%)	Interval (0-100)

	Explanatory variables	Description	Type
sector destination	SC2	Automotive industry (%)	Interval (0-100)
	SC3	Others terrestrial transports sector (%)	Interval (0-100)
	SC4	Footwear and textiles (%)	Interval (0-100)
	SC5	Construction (%)	Interval (0-100)
	SC6	Electrical/ electronic (%)	Interval (0-100)
	SC7	Domestic electrical appliance (%)	Interval (0-100)
	SC8	Renewable energy sources (%)	Interval (0-100)
	SC9	Food product packaging (%)	Interval (0-100)
	SC10	Rest of packaging (%)	Interval (0-100)
	SC11	Hygienic-sanitary (%)	Interval (0-100)
	SC12	Toys and leisure (%)	Interval (0-100)
	SC13	Household goods (%)	Interval (0-100)
Strategic factors relating to the firm' successful (SF)	SF1	Importance of availability and quality supply of materials	Scale (1-5)
	SF2	Importance of negotiation power with the clients	Scale (1-5)
	SF3	Importance of better quality/cost rate	Scale (1-5)
	SF4	Importance of quality certification	Scale (1-5)
	SF5	Importance of R&D activity	Scale (1-5)
	SF6	Importance of firm image	Scale (1-5)
	SF7	Importance of specialized products	Scale (1-5)
	SF8	Importance of new products development	Scale (1-5)
	SF9	Importance of enviromental factors	Scale (1-5)
	SF10	Importance of financing access	Scale (1-5)
	SF11	Importance of comercial promotion	Scale (1-5)
	SF12	Importance of wide variety of products	Scale (1-5)
	SF13	Importance of trained workforce	Scale (1-5)
Cooperation	C_purchases	In the purchases area	Binary (0,1)
	C_production	In the production area	Binary (0,1)
	C_logistic	In the logistic area	Binary (0,1)
	C_commercial	In the commercial area	Binary (0,1)
	C_technology	In the technology area	Binary (0,1)
Location	ID	Location in industrial districts (Boix and Galletto, 2006)	Binary (0,1)
	ID_spe	Location in industrial district with a specialisation similar to the company's main sales sectors (Boix and Galletto, 2006)	Binary (0,1)

Source: Authors' elaboration.

Tabla 12. Results of the estimations (Logit model)

Dependent variable: Innovative firm (1) / Non-innovative firm (0)						
	Model 1		Model 2		Model 3	
Variable	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Employment	0,251	0,012**	0,248	0,022**	0,250	0,011**
Reg_purchases	0,052	0,054*	0,052	0,060*	0,054	0,052*
SC1	-0,082	0,014**	-0,080	0,042**	-0,075	0,025**
SC3	-0,669	0,025**	-0,665	0,030**	-0,665	0,027**
SC8	-2,824	0,731	-2,798	0,722	-2,627	0,684
SC12	-0,280	0,009***	-0,277	0,015**	-0,269	0,011**
SF2	-4,122	0,023**	-4,096	0,028**	-3,982	0,027**
SF10	-3,920	0,010***	-3,896	0,013**	-3,844	0,010***
SF12	4,315	0,013**	4,286	0,018**	4,271	0,014**
C_purchases	-9,799	0,013**	-9,723	0,019**	-9,550	0,014**
C_production	6,823	0,031**	6,819	0,032**	6,936	0,034**
C_logistic	-7,162	0,038**	-7,124	0,042**	-6,820	0,040**
ID			0,078	0,056*		
ID_spe					0,769	0,602
Constant	18,138	0,019**	17,980	0,028**	16,804	0,031**
Models characteristics	Model 1		Model 2		Model 3	
N° cases	69 (75%)		69 (75%)		69 (75%)	
Prediction % (Yes, 1)	98,04		99,04		96,078	
Prediction % (No, 0)	83,33		84,33		83,333	
Global prediction %	94,20		95,20		92,754	
-2 log likelihood	24,10		22,10		23,812	
R square of Cox and Snell	0,55		0,60		0,552	
R square of Nagelkerke	0,81		0,84		0,808	

Note: Coefficient significant test, (*) Sig <0,1, (**) Sig <0,05, (***) Sig<0,001. All models are statistically significant (Log likelihood, Omnibus test, Hosmer y Lemeshow test).

Source: Authors' elaboration.

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