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Barriers to innovation in Spanish rural Small and Medium-Sized Enterprises

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Abstract: In the context of globalisation, innovation has been recognized as a key driver of national and regional economies, whether rural or not. Nevertheless, rural firms are considered less innovative than firms in urban agglomerations. Rural areas represent three-quarters of the land of the OECD countries and are home to a quarter of its population. This paper reviews the barriers to innovation indicated throughout literature and brings out the main barriers in rural Spanish Small and Medium-Sized Enterprises (SMEs). Data were collected through a survey carried out among managers of 511 SMEs in a rural area of Spain. The results identify key factors that hinder innovation, namely those related to economic reasons, such as high costs of the innovation or the difficulty to obtain financial resources, and risk aversion issues. Specific research related to the study of innovation obstacles in SMEs firms in rural areas is limited. This paper fills this research gap by expanding the body of knowledge in the field of rural SMEs innovation and provides further evidence on this phenomenon. The results also offer relevant insights for managers and policy makers when formulating and implementing strategies to diminish innovation barriers in rural SMEs.

Keywords: *SMEs, innovation, rural, barriers.*

Introduction

Understanding barriers and determinants of business innovation is crucial for the competitiveness and for economic growth of SMEs. According to the literature, factors that influence on the innovation are traditionally classified as external and internal drivers. Even though innovation is inherently linked to each firm, the context in which the enterprise operates will also have an influence on the innovation of the businesses. Lack of sufficient diversity, good connections with the outside or sufficiently large clusters, will not probably offer the required environment for innovation in rural areas (Shearmur and Doloreux, 2016).

Although there is an extensive range of literature on innovation, which includes recent works using firm level data, previous studies usually focus on large and non-rural firms. Despite the importance of rural areas, which represent a huge part of the land of the OECD countries and a strategic instrument for economic growth, human development and environmental equilibrium (OECD, 2017), few works deal with innovation barriers in these particular regions (Kotey and Sorensen, 2014; North and Smallbone, 2000). As Esparcia (2014) argue, innovation is a key factor for the development of rural areas.

The object of the current study is to identify the factors that inhibit innovation in SMEs located in rural areas. Innovation barriers in SMEs in a South European rural province are

analysed. This is used as a case study area because it is a “predominantly rural region” based on criteria of population density and size of the urban centres located within it.

First, the study analyses the importance of barriers preventing development of innovation projects for both, innovative and non-innovative firms. Furthermore, the main barriers will be analysed depending on the innovator nature of the firm and the type of innovation implemented.

The results provide useful information for managers of rural SMEs and for policy-makers to design public policies, which, in turn, could allow rural SMEs to innovate in order to respond more favourably to the new market requirements.

Literature Review

Innovation results for firms can be explained by differences in location (Kotey & Sorensen, 2014). Factors like distance from suppliers, clients or research institutions, lack of relevant human and knowledge resources, infrastructure or financial resources for innovation, are considered potential explainers of innovation gap for SMEs in rural locations (Battisti et al., 2010). The geography of innovation highlights the importance of geographic location as an enabler or a barrier to innovation (Shearmur and Doloreux, 2016; Moulaert and Sekia, 2003).

Barriers to innovation

Challenges to innovation include those factors that inhibit innovation (Hadjimanolis, 1999, 2000). There are many inhibitor factors that act as barriers to innovation in rural SMEs. They may be related to economic reasons, such as high costs of improvement; firm-specific factors, such as lack of knowledge or skilled personnel; and environmental factors, such as uncertainty, or legal issues (OECD, 2005). These factors place obstruction in the process of innovation. According to the academic literature review, factors that may hamper innovation activities are diverse.

High cost

The cost of the innovation is usually considered as a barrier (Segarra-Blasco and Arauzo-Carod, 2008). Moreover, the importance of this barrier is higher in SMEs than in larger companies (Madrid-Guijarro et al., 2009). This factor affects more these enterprises due to their lack of financial resources. Additionally, the costs of innovation are usually more difficult to control than other types of expenditures (Baldwin and Lin, 2002; Hadjimanolis, 1999; Zwick, 2002).

Difficulty to obtain financial resources

SMEs often lack internal funds to carry out innovation projects. In addition, they have more difficulties to access to external funding than larger firms (OECD, 2005; Moreno et al., 2011). Access to capital is a recurrent problem suffered by SMEs, mainly because these enterprises are often unable to give the guarantees that traditional lenders require (European Commission, 2005). So, financial resources can be a decisive factor for innovation in rural SMEs, and economic constraints may affect their ability to innovate (Hewitt-Dundas, 2006; Madrid-Guijarro et al., 2016).

Lack of qualified personnel

Human resources are one of the main intangible assets of a company. Several studies have recognized the importance of employees and human resources management for innovation (Baldwin and Lin, 2002; Cano and Cano, 2006; D'Este, Rentocchini and Vega-Jurado, 2012). In particular, the relationship between firm-level innovativeness and different skills has been studied (Freel, 2005). Enterprises with more trained workers,

able to improvise and analyze complex problems, will be in a better position to develop innovation (Madrid-Guijarro et al., 2009). On the contrary, the lack of skilled workers will increase the resistance to change and will be an obstacle to innovation. In the extent that SMEs employees present a lower level of education and training (Kotey and Folker, 2007) it will negatively affect innovation. SMEs difficulties to keep qualified employees also constitute a barrier to innovation (Zwick, 2002; Hadjimanolis, 1999).

Lack of market knowledge

The poor information about markets and the uncertainty of demand are considered factors that inhibit innovation in SMEs (Cordero and Vieira, 2012). Information about market opportunities reinforces the development of innovations in order to better-satisfied customer's needs (Madrid-Guijarro et al., 2009). On the contrary, the lack of market information and knowledge become an obstacle to innovation (Hewitt-Dundas, 2006; Hadjimanolis, 1999). Information and Communication Technologies (ICT) development may improve accessibility to remote market information exchange in rural SMEs, reducing barriers related to lack of market knowledge. As Zasada et al. (2013) said, sometimes modern industries are dependent on goods frequently produced in urban areas and the transfer of knowledge delivered by city-based companies (Kalantaridis 2010).

Risk of innovation

Innovation exposes firms to additional risk (Madrid-Guijarro et al., 2009), especially in the case of SMEs. The intangibility and specificity associated with innovation investments increase the risk perceived in SMEs, which has often been suggested as a cause of lower levels of innovation (Zwick, 2002). As Moreno et al. (2011) explain, the aversion to risk has a negative impact on innovations and is considered one of the most important barriers in SMEs. Culturally-based obstacles, aversion risk, and entrenched traditional management practices managers that encourage inertia, explain the low innovation outcomes for rural SMEs (McAdam et al., 2004).

The following research questions are proposed after reviewing the literature: Which are the most important barriers to innovation in the Spanish rural SMEs? Are these barriers different depending on the type of innovation –product, process, market, and organizational–?

Methodology

In order to validate our research model and offer an answer to the investigation questions, an empirically study was conducted. First, a group of experts, academic researchers and rural development practitioners, selected the most important barriers to innovation in rural areas. After that, a questionnaire was designed to obtain the information required for the study. Finally the data were collected and the results were obtained. Statistical analysis was performed with SPSS software package.

Sample and data collection

We collected data from a sample of more than five hundred Spanish firms (511) in 2014. The data were compiled through a questionnaire for managers of SMEs designed to the investigation as a part of a larger project.

This study draws on a dataset for the year 2014. The reference population is composed by all rural firms of the province of Teruel (Spain) with less than 250 employees, representing the SMEs. We focused on this area because Teruel is one of the “predominantly rural” regions of Europe, according to the new urban–rural typology put forth by the OECD (2012). It does not contain an urban centre of more than 200 000

inhabitants and the share of population living in rural local units with population density far below 150 inhabitants/km² is higher than 50%. Moreover, Teruel is one of the Spanish provinces with higher percentages of SMEs above the total of their firms (99.95%) (Ministry of Economy, Industry and Competitiveness, 2017).

Variables measurement

Our questionnaire required managers to indicate whether the firm has introduced some of the following innovations -product, process, marketing and/or organizational innovation- since the beginning of the 2008 crisis period:

- (1) Product innovation: changes in the design of products.
- (2) Process innovation: changes in manufacturing processes.
- (3) Marketing innovation: changes in marketing methods.
- (4) Organizational innovation: changes in organizational methods.

An innovative firm is one that has implemented at least one of these types of innovations during the period 2008-2014.

Results and Discussion

We find that the most important barriers to innovation in rural SMEs are high cost, difficulty to obtain financial resources, risk of innovating, lack of qualified employees and lack of market knowledge. SMEs in our sample identify high cost and lack of available finance as the first and second most important barrier to innovation (5.62 and 5.35 respectively), but it is interesting also underline the high scores given to all barriers, all over 3.5 in the scale from 1 to 7 (Table 1).

Table 1: Statistics of the barriers to innovation

	N	Minimum	Maximum	Mean	S.D.
High cost	490	1	7	5.62	1.490
Difficulty to obtain financial resources	487	1	7	5.35	1.847
Lack of qualified personnel	485	1	7	3.97	1.804
Lack of market knowledge	482	1	7	3.81	1.769
Risk of innovate	482	1	7	4.13	1.803
N	475				

a) Depending on the innovative character of the firm

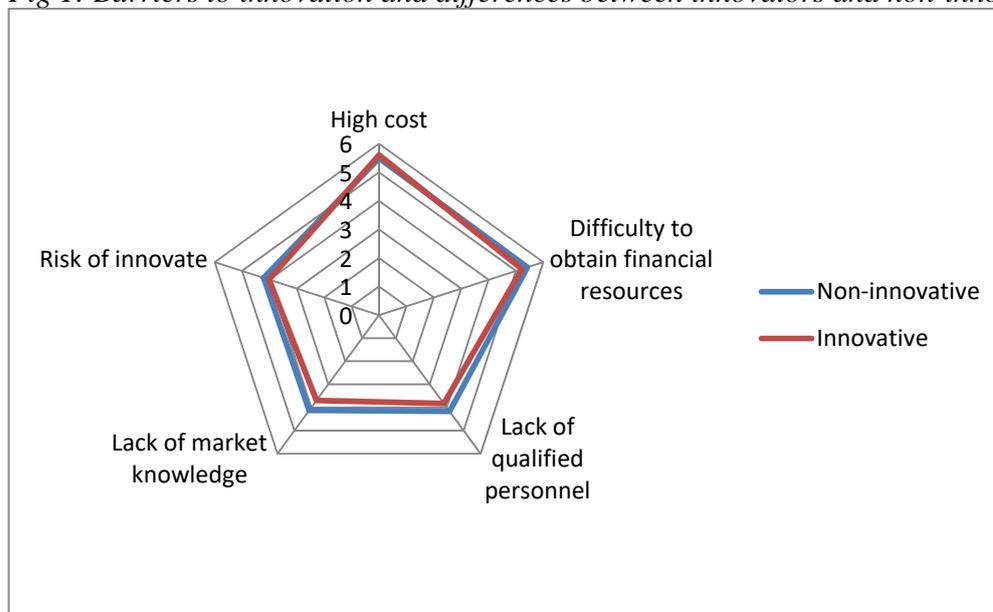
We review the role playing by each of the barriers depending on the innovative character of the firm, in order to see if there are differences between innovative and non-innovative enterprises. Table 2 shows the statistical differences between both groups of firms. The order of the scores assigned to each obstacle remains unchanged. However, we find differences statistically significant in the importance given to the lack of qualified personnel and of knowledge of the market. Firms that do not innovate value the role of lack of qualified personnel and the lack of knowledge of the markets at a higher level than innovative firms (values above 4 in non-innovative firms, compared to values below 4 in innovative firms) (Figure 1).

Table 2: Barriers to innovation and differences between innovators and non-innovator

	Innovate	N	Mean	Standard deviation	Standard error mean	Sig. (2-tailed)
High cost	No	104	5.49	1.372	.135	.459
	Yes	332	5.61	1.544	.085	
Difficulty to obtain financial resources	No	105	5.42	1.786	.174	.355
	Yes	330	5.23	1.905	.105	
Lack of qualified personnel	No	105	4.17	1.718	.168	.091*
	Yes	330	3.83	1.803	.099	
Lack of market knowledge	No	105	4.13	1.687	.165	.028**
	Yes	327	3.70	1.768	.098	
Risk of innovating	No	103	4.21	1.684	.166	
	Yes	329	4.02	1.833	.101	.337

By type of innovation, we see that there are no differences in the order of most to least valued barriers. In all the cases is the high cost the most important one, and the lack of market knowledge the least (Table 3 and Figure 2).

Fig 1: Barriers to innovation and differences between innovators and non-innovator

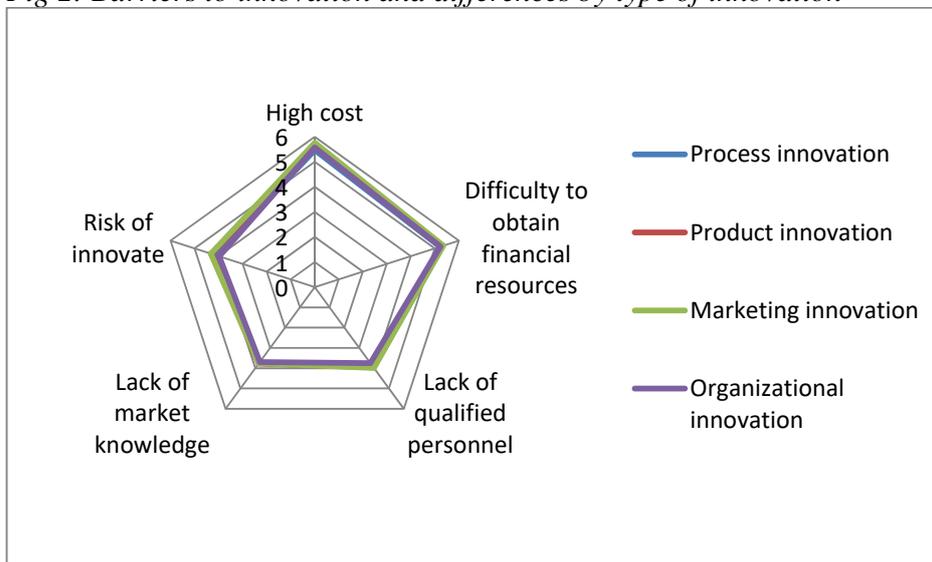


b) Depending on the type of innovation implemented

Table 3: Barriers to innovation and differences by type of innovation

	Process innovation		Product innovation		Marketing innovation		Organizational innovation	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
High cost	5.47	1.622	5.65	1.153	5.76	1.443	5.57	1.588
Difficulty to obtain financial resources	5.22	1.907	5.31	1.891	5.36	1.900	5.23	1.907
Lack of qualified personnel	3.93	1.773	3.96	1.807	3.99	1.804	3.75	1.783
Lack of market knowledge	3.76	1.766	3.77	1.735	3.76	1.732	3.70	1.820
Risk of innovating	4.13	1.871	4.29	1.795	4.32	1.758	3.98	1.837

Fig 2: Barriers to innovation and differences by type of innovation



Moreover, when we distinguish by type of innovation (Table 4), in order to compare the importance given to each barrier by innovators and non-innovators, we find slight differences. We can see that the mean scores given to all barriers of innovation do not statistically differ between the group of firms that have introduced product or process innovations and the rest of firms, and only do in three cases for the firms that implement marketing and organizational innovations. High cost and risk of innovating are perceived as more important barriers to innovation for firms that have implemented marketing innovations while the lack of qualified personnel is perceived as a higher barrier by the firms that do not implement organizational innovations.

Table 4: Barriers to innovation and differences by innovator and type of innovation

By type of innovation	Innovate	Process		Product		Marketing		Organizational	
		N	Mean	N	Mean	N	Mean	N	Mean
High cost	no	344	5.67	328	5.60	286	5.52	228	5.62
	yes	117	5.47	134	5.65	180	5.76	247	5.57
Sig. (2-tailed)			0.209		0.738		0.087*		0.751
Difficulty to obtain financial resources	no	343	5.34	329	5.32	287	5.29	227	5.43
	yes	116	5.22	132	5.31	178	5.36	245	5.23
Sig. (2-tailed)			0.586		0.965		0.695		0.233

Lack of qualified personnel	no	343	3.96	328	3.98	287	3.90	227	4.16
	yes	116	3.93	133	3.96	177	3.99	243	3.75
Sig. (2-tailed)			0.871		0.943		0.593		0.014**
Lack of market knowledge	no	342	3.83	327	3.83	286	3.84	223	3.87
	yes	114	3.76	131	3.77	175	3.76	244	3.70
Sig. (2-tailed)			0.725		0.736		0.652		0.327
Risk of innovating	no	341	4.09	325	4.00	282	3.97	224	4.25
	yes	115	4.13	133	4.29	178	4.32	243	3.98
Sig. (2-tailed)			0.820		0.128		0.040**		0.275

*p< 0.10; p<0.05;***p<0.001

c) *Depending on the innovation intensity of the firm*

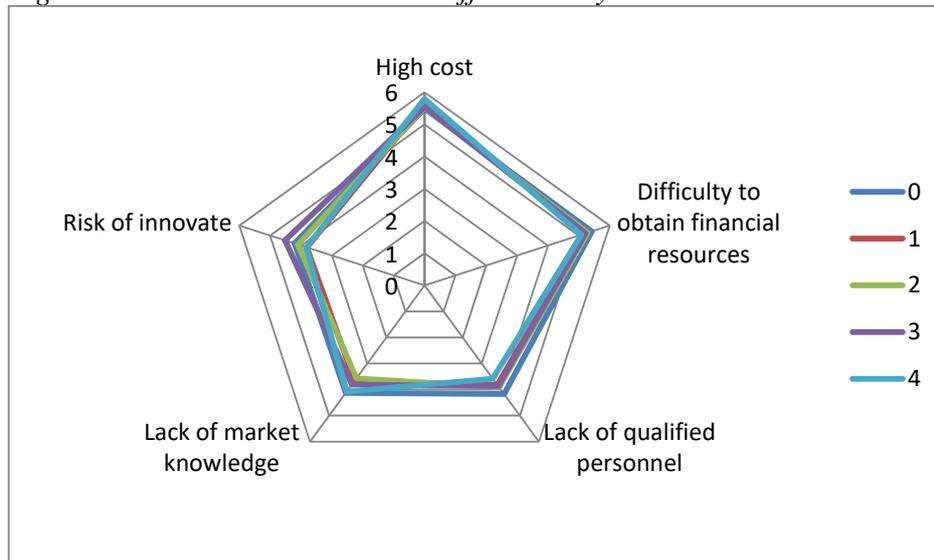
Lastly, we analyze differences in the barriers to innovation identified by different groups of firms, according to their innovative index (Table 5 and Figure 3). The analysis of variance (ANOVA) identifies the statistical differences between groups of firms depending on their index of innovation. In this case, only statistically significant differences appear to the risk of innovating barrier, but with a low level of significance (p<0.10). This means that perceptions of barriers to innovation are similar irrespective of the innovation intensity of the firm.

Table 5 Barriers to innovation and differences by innovation index (ANOVA)

		High cost	Difficulty obtain financial resources	Lack qualified personnel	Lack market knowledge	Risk innovating
Innov Index						
0	Media	5.49	5.42	4.17	4.13	4.21
	N	104	105	105	105	103
	S.D.	1.372	1.786	1.718	1.687	1.684
1	Media	5.65	5.23	3.82	3.67	3.81
	N	159	159	159	157	157
	S.D.	1.505	1.886	1.869	1.838	1.868
2	Media	5.52	5.29	3.91	3.57	4.10
	N	88	87	86	87	88
	S.D.	1.626	1.910	1.800	1.723	1.826
3	Media	5.54	5.22	3.87	3.81	4.52
	N	61	60	61	59	60
	S.D.	1.689	1.967	1.793	1.581	1.722
4	Media	5.79	5.08	3.58	4.08	3.83
	N	24	24	24	24	24
	S.D.	1.103	1.976	1.442	1.932	1.736
Total	Media	5.58	5.28	3.91	3.81	4.06
	N	436	435	435	432	432
	S.D.	1.504	1.877	1.787	1.756	1.799
	F	.369	.258	.880	1.643	2.056
	Sig.	.830	.905	.476	.163	.086

*p< 0.10; p<0.05;***p<0.001

Fig 3: Barriers to innovation and differences by innovation index



Conclusion

The importance of rural areas and SMEs in our economies increases the interest of the study of innovation in rural SMEs by researchers and public institutions. Our results confirm that high scores are assigned to most of the barriers examined. The factors that discourage innovation are high cost, difficulty in obtaining financial resources, risk of innovating, lack of qualified employees and lack of market knowledge. This paper has implications for business practice and for policies to boost innovation implementation in rural SMEs. Identifying enterprises' barriers to innovation and their importance is of help in developing organizational strategies to support innovation.

Alike, it is necessary to identify the most important barriers to innovation in SMEs in order to removing them, minimizing them or converting them into facilitators of innovation (Cordero and Vieira. 2012). Firms should also take into account the differences derived from the particular type of innovation implemented. Furthermore, examining the forces that condition the innovation activities is important for the public authorities in charge of promoting innovation. In this line, support for SMEs is one of the priorities of the European Commission in order to reinforce the economic growth, job creation and economic and social cohesion. In this regard, there are emerging requirements so that companies and institutions devote efforts to achieve innovative working environments where people are able to exploit all the opportunities for innovation within reach (European Economic and Social Committee. 2011). Moreover, the identification of barriers to innovation in rural firms can deliver information on relevant issues for innovation policy. Initiatives such as promotion of networks could compensate for rural location-related disadvantages (Reidolf, 2016).

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