



The problems of environmentally involved firms: innovation obstacles and essential issues in the achievement of environmental innovation



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ABSTRACT

Environmental innovation has been discussed from different approaches in the last decade, due to its increasing importance for business competitiveness and as an engine for the economic development of a country, especially in recessionary economic phases. However, the study of the factors that hinder the achievement of environmental innovations has been largely neglected. This paper focuses on the obstacles facing firms involved in environmental innovations and how they still manage to achieve these innovations. The data used comes from the Community Innovation Survey (CIS) conducted in Spain in the year 2012, while the Wilcoxon-Mann-Whitney test and binary logistic regression are the statistical techniques used. The findings show that the obstacles that companies involved in environmental innovations face are greater and different to those faced by companies which are not involved in them. Consequently, environmental innovation requires different action plans from those for non-environmental innovation; these actions include public funding, and cooperation, as well as other specific support measures. This research provides a systematic framework for environmental innovation and the ways to overcome the barriers to this innovation. Thereby supplying a roadmap for the creation of an innovation system that constitutes a favourable context for overcoming these obstacles, thus bringing about the success of the environmental innovation process through certain critical factors.

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1. Introduction

In recent decades, concern about environmental economics (Janicke, 2008; Kneese, 1977; Mani and Wheeler, 1998), sustainable development (Ayes, 1978; Schaper, 2007; Shaw and Kidd, 2001) and corporate social responsibility (Aras and Crowther, 2009; Jackson and Apostolakou, 2010; Van Bommel, 2011) has increased progressively at a global level. Thus, it is necessary to articulate appropriate technological and environmental policies (Baumol and Oates, 1979; Magat, 1982; Vig and Kraft, 1990), supported by a consolidated and stable political and institutional environment (Yandle, 1989), which stimulate growth and competitiveness in productive and exporting economies (Fleith et al., 2014; OECD, 1999; Stallings and Peres, 2000).

Moreover, in the general framework of corporate social responsibility (CSR), companies are becoming increasingly sensitised to the achievement of specific objectives which are conducive to the protection of the natural environment, or reduction of the environmental impacts that are generated by the production of goods or the provision of services relating to the various activities that they carry out (Bansal and Roth, 2000; Cuerva et al., 2014; Robbins, 2001). Indeed, numerous studies show the implementation of environmental strategies and actions as priorities for achieving economic returns in corporations (Da Silva et al., 2009; Hallstedt et al., 2013; Singh et al., 2008), with the aim of promoting such strategies and analysing when and how they can generate economic return (Boons and Lüdeke-Freund, 2013; Verbeke et al., 2006).

In addition, the research by other authors focuses on the analysis of the different types of environmental management systems (Netherwood, 1998), comparing the different strategic options for environmental management among small and large businesses (Dilts and Prough, 1989; Russo and Tencati, 2009). Other studies

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analyse the influence of managerial and organisational factors as determinants of the choice of an appropriate corporate environmental strategy (Hallstedt et al., 2013; Sharma, 2000), evaluating environmentally conscious business practices (Sarkis, 1998; Tseng et al., 2011), and ultimately controlling and auditing the environmental management systems and their results (Melnyk et al., 2003; Taylor et al., 2001).

It should also be noted that the literature devoted to the analysis of environmental impact management performed by small and medium enterprises (SMEs) is extensive (Klewitz and Hansen, 2014). Especially noteworthy are those studies addressing the identification and analysis of the various factors that determine the efforts of SMEs to increase their environmental awareness and reduce the impact on the natural environment (Gadenne et al., 2009; Petts et al., 1998; Williamson and Lynch-Wood, 2001).

On the one hand, other research papers analyse the relationships between environmental responsibility and the achievement of competitive advantages (Simpson et al., 2004), among different environmental management systems and the problems arising from SME size (Biondi et al., 2000; Gerstenfeld and Roberts, 2000; Williamson et al., 2006), or address the enhancement of those environmental actions and practices already consolidated (Friedman et al., 2000; Roberts et al., 2006; Rowe and Hollingsworth, 1996). Regarding the geographic scope, although many researchers address a specific national scope – as for example, the research undertaken by Naffziger and Montagno (2003) concerning the perceptions of environmental awareness in small businesses in the United States, Tilley (1999), which addresses the environmental strategy of small businesses in the UK, and Schaper (2002), which focuses on the environmental management of small pharmaceutical companies in Western Australia –, other researchers, such as Rutherford et al. (2000) develop international comparative studies.

On the other hand, environmental innovation has been discussed from different approaches in the last decade (Chen et al., 2012; Buysse and Verbeke, 2003). However, the factors that hinder the achievement of environmental innovations have been neglected (Keskin et al., 2013), despite the fact that environmental innovation is increasingly important in achieving competitive advantages (Boons et al., 2013; Chiou et al., 2011; Eiadat et al., 2008). In other words, the necessary attention has not yet been given to those firms facing barriers to environmental innovation nor to the existence of differences in the innovation obstacles faced by firms involved in environmental innovations and those firms which are not involved in them.

The aim of this paper is to address the obstacles to environmental innovation through an analysis of the differences between the firms involved in environmental innovations and those firms that are not involved in them. To complement this approach to environmental innovation obstacles, it also analyses the critical aspects in overcoming them.

2. Environmental and business innovation

At present, the role played by innovative and technology-based companies as drivers of economic development (Cabrera and Soto, 2010; Donkels and Pierre, 1990; Hamel, 2006) is essential, even more so in the light of a global economic environment in crisis (Fagerberg, 2005; Souto, 2012); this is, above all, due to their usefulness in the development of more competitive firms (Dosi, 1988; Geroski, 1995; Schneider and Veugelers, 2010) in increasingly interconnected markets in which technological life cycles are becoming shorter (Schumpeter, 1939).

In this context, the Oslo Manual conceived innovation as the design and implementation of significant changes in the product,

process, marketing or organisation of the corporate economic unit, in order to improve its results (OECD and EUROSTAT, 2005). Thus, innovative changes are performed by the application of new knowledge and technology, which can be developed through three procedures: firstly, internally; secondly, through external collation; or thirdly, acquisition through advisory services or the purchase of technology (Bessant and Tidd, 2009; Fagerberg, 2005). In this regard, innovation activities would encompass all those scientific, technological, organisational, financial and trading actions that lead to innovation, taking into consideration both the activities that have proven successful, as well as those that are in still in progress or formed part of projects since terminated for lack of viability (Smith, 2005).

The Oslo Manual also defines an innovative company as one that has introduced at least one innovation or innovative activity, although this may not yet have yielded any results (OECD and EUROSTAT, 2005). Furthermore, Smith (2005) highlights the difficulty in measuring innovation through the volume of expenditure on R&D in the company, given that, although it is a measure that can be taken into account when combined with other indicators, such as the income from products introduced into the market in the last two years, it does not measure the training in innovation activities received by employees, or other costs not identified by the company as belonging to R&D. In addition, innovative companies have been proved to have higher growth rates than those that are non-innovative, with regard to increased product turnover (Souto, 2012). This is achieved through the use of new knowledge or a new combination of existing knowledge, through the development of activities of product innovation, process innovation, marketing innovation, and, ultimately, innovation in organisation (Bessant and Tidd, 2009; Dosi, 1988; OECD and EUROSTAT, 2005).

Moreover, in the private business sector the combined effects of the international financial crisis and the evolution of global climate change have promoted the progress and development of sustainable business (Boons et al., 2013) and environmental innovation (Potts, 2010; Reid and Miedzinski, 2008; Tseng et al., 2012), leading to the genesis of a wide range of products and services oriented towards the environment (Chang and Fong, 2010; Fleith et al., 2014; Keskin et al., 2013). In addition, national governments are formulating environmental policy activities and dynamics, involving public availability of investments for the development of green economies, as one response to the global financial crisis. Authors, such as Potts (2010), also stress the importance of developing a regional scale model, based on the natural advantage that integrates innovation and environmental sustainability, as part of the regional development policy agenda, by creating business networks and sustainable communities, while others such as Arnaud and Sekerka (2010) analyse the ethical aspect of introducing innovation in support of environmental sustainability.

Other works such as Tseng et al. (2013) evaluated the practices of sustainable innovation in Taiwanese corporations, analysing factors that focused on process management, product innovation and technological aspects, while several studies examined the effects of environmental innovation on the competitive advantages of firms (Chiou et al., 2011; Eiadat et al., 2008; Shrivastava, 1995), the selection of specific environmental technologies (Klassen and Whybark, 1999; Tseng, 2010), the integration of suppliers in the development of eco-innovation (Lee and Kim, 2011; Zailani et al., 2011), and environmental sustainability of the supply chain for the cases of China and Japan (Zhu et al., 2007, 2010; Zhu and Sarkis, 2006). There has also been some interesting work on environmental innovation management in SMEs (Cuerva et al., 2014; Klewitz and Hansen, 2014; Noci and Verganti, 1999).

Finally, the work of Chen (2008) should be noted for the correlation between environmental skills investments and its positive

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