



Journal of Business & Industrial Marketing

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Article information:

To cite this document:

F. Javier Ramirez, Gloria Parra-Requena, Maria J. Ruiz-Ortega, Pedro M. Garcia-Villaverde, "From external information to marketing innovation: the mediating role of product and organizational innovation", Journal of Business & Industrial Marketing, <https://doi.org/10.1108/JBIM-12-2016-0291>

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<https://doi.org/10.1108/JBIM-12-2016-0291>

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From external information to marketing innovation: the mediating role of product and organizational innovation

Abstract

Purpose – This paper aims to further understand how firms transform external information into marketing innovation. The specific aim is to analyse the mediating role of product innovation and organizational innovation in the relationship between external information and marketing innovation.

Design/methodology/approach - The study builds on the 2012 database *Technological Innovation Panel* (PITEC) with a sample of 994 manufacturing firms. The data are analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM).

Findings - The results show how external information obtained about relationships with suppliers, customers and competitors leads to marketing innovation. The study demonstrates the mediating effects of product innovation and organizational innovation on the relationship between external information and marketing innovation.

Practical implications – Firms should utilize external information flows to innovate in both their products and organization as a prerequisite to marketing innovation.

Originality/value – This paper provides linkages between perspectives of networks, innovation and marketing to better understand the background of the least studied dimension of innovation -marketing innovation-. The main contribution is to explain how firms use external information to achieve marketing innovation through product and organizational innovation.

Keywords: External information, Marketing innovation, Product innovation, Organizational innovation, Mediating effect

Article Classification: Research paper

Introduction

The literature highlights external information from relationships with customers, competitors and suppliers as a key antecedent of innovation (Kim and Lui, 2015; Charterina, Basterretxea and Landeta, 2017). Innovation researchers have focused mainly on technological innovations whilst marketing researchers have studied marketing innovation from a very limited perspective (Camisón and Villar-López, 2011). However, several authors have highlighted the current relevance of marketing innovation with regard to competition in the global and dynamic

environment (Medrano and Olarte-Pascual, 2016), since it provides a way of differentiating firms from their competitors and adapting to markets in order to gain a competitive advantage. In order to confront this lack of global understanding of marketing innovation, new studies concerning the key antecedents and the processes that lead to marketing innovation are needed (Geldes and Felzensztein 2013). Several authors suggest that external information affects marketing innovation (Sidhu, Commandeur and Volberda, 2007) because information regarding new opportunities, use of products, consumer preferences and production processes is based mainly on tacit knowledge. However, managerial practice indicates that, in many cases, this external information is neither novel nor relevant to marketing innovation, since it is biased towards other types of innovation. There is a research gap regarding the ambiguity of the relationship between external information and marketing innovation, due to the interaction of advantages and disadvantages derived from network paradoxes (Hakansson and Ford, 2002). Thus, the question to be answered is: How does external information affect marketing innovation? Moreover, several authors suggest that different types of innovation are connected (Gunday *et al.*, 2011) and that this interconnection can affect the relationship (Damanpour and Gopalakrishnan, 2001). Therefore, we raise a more specific question: What role do other types of innovation have in explaining the relationship between external information and marketing innovation?

This study proposes that product innovation and organizational innovation can help explain the connection between external information and marketing innovation, because these types of innovation are nourished by external information and increase the expectations for successful marketing innovations (Schubert, 2010; Medrano and Olarte-Pascual, 2016). Thus, both types of innovation -product and organizational- can lead external information towards marketing innovation so as to respond to the actions of the competition and take advantage of market opportunities. The specific aim is *to analyse the mediating role of product innovation and organizational innovation in the relationship between external information and marketing innovation*, that is, how external information leads firms to marketing innovation through product and organizational innovation. This study can help to reinforce the connection between network theory, innovation literature and marketing, moving towards a better understanding of the antecedents of

marketing innovation.

In contrast to the majority of previous studies, which have focused on a specific industrial context, the Spanish database *Technological Innovation Panel* (PITEC) used in this work enables the study of the proposed relationships in a wide sample of manufacturing companies in Spain. The study has been developed in the context of economic crisis, with high uncertainty, in which external information acquires special relevance to drive companies toward marketing innovation.

This paper is structured as follows: First, the theory and derived hypotheses are explained. Next, the methodology is described, followed by the results. Finally, the discussion, conclusions, managerial implications, limitations and future research are presented.

Theory and hypotheses

Marketing innovation

Innovation plays a key role in defining the way in which a company competes and utilizes market opportunities to achieve competitive advantages (Gunday et al., 2011). Schumpeter (1942:133) analysed the entrepreneurial conditions in which companies were interested or were capable of making innovations, understood as a “new combination of developmental changes”. Changes in the product, in the market and in the manufacturing process are included in this approach. In contrast to studies presenting innovation as an overall construct, a number of authors have suggested examining the backgrounds and consequences of each type of innovation (Ganter and Hecker, 2013; Kim and Lui, 2015). Although different types of innovation are identified in the literature, the third edition of the Oslo Manual (OECD, 2005) incorporates a widely accepted classification that differentiates between four primary types of innovation: product, process, organizational and marketing. Several works analyse marketing and innovation as two complementary elements that affect firms’ strategy and performance (Sarkees and Luchs, 2015; Hsu, 2016). Although the term marketing innovation has been used in academic literature for decades (Levitt, 1960), only a few

works have studied it in any detail (Shergill and Nargundkar, 2005; Camisón and Villar-López, 2011), and those that have analysed its determining factors are very few and far between indeed (Halpern, 2010; Medrano and Olarte-Pascual, 2016). The late incorporation of both the definition and the study of marketing innovation, in innovation and marketing literature, explains this deficiency (Weerawardena, 2003). In fact, attention has only been substantially focused on marketing innovation since its inclusion in the Oslo Manual (OECD, 2005), which defines it as “the application of a new marketing method for a product or service accounting for significant alterations to any of the following elements: product design or packaging, placement, promotion or prices establishing criteria.”¹ This concept entails four levels: 1) designing or packaging of the product or service; 2) applying new methods of distribution or placement of products and services or new sales channels; 3) using new techniques or media to promote the products or the firm; and 4) pricing policy. These methods of marketing innovation seek to increase the penetration of a firm’s products and services in the current market or new markets (Heunks, 1998).

Thus, marketing innovation represents the use of new activities and marketing procedures, including changes in the nature of the product, marketing communication tools, the launch of new brands, new techniques for fixing prices and new methods of market research. According to the Oslo Manual (OECD, 2005), the aims of these marketing innovation methods are “better addressing customer needs, opening up new markets, or newly positioning a firm’s product on the market, with the aim of increasing the firm’s sales”. Hence, the main objective of marketing innovation is to increase demand for a firm’s products.

Several authors highlight the connection between marketing and innovation according to its origin (Matuš *et al.*, 2015). Innovations driven by technology are based on the materialization of the scientific and technological knowledge of the firm, while innovation driven by demand is caused by changes in the needs of consumers. Thus, the market seeks new and improved products from companies based upon the customers’

¹ This conception of marketing innovation, based on the 4 P’s scheme, is different from the perspective of market innovation, focused on creating new markets or forming the whole market, in a fashion that markets are what actors make them to be (Storbacka and Nenonen, 2011).

needs. From this approach, the company's task is to find and prepare a technological, organizational and marketing solution to meet those needs.

The PITEC survey considers marketing innovation as new commercial strategies involving significant changes in product design or in the packaging of the products or services, new techniques or channels for promotion of the product, new methods for positioning the product in the market or sales channels, and new methods to set the price of products or services. The objectives of these strategies are the growth or improvement of market share, the inclusion of products in new customer groups and the inclusion of products in new geographical markets.

Effect of external information on marketing innovation

Granovetter (1985) highlighted that individual behaviours cannot be understood without considering their social relationships because economic interactions are embedded in the network of social and personal relationships. In this vein, economic action is embedded in social links which can promote the transference of relevant information between agents (Adler and Kwon, 2002). Thus, network theory stated the importance of the potential benefits of the positioning of one agent in a favourable social network (Bourdieu, 1986; Zaheer et al., 2010). Therefore, the key concept in network theory is that the networks of relationships are a valuable resource that provides agents with access to collective resources and allows them to obtain several advantages (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998).

From this perspective, innovation not only depends on the skills of the company but also on the effectiveness in accessing external sources of information through their network of relationships (Kline and Rosenberg, 1986). Contact with agents outside the organization allows companies to overcome certain limitations of their own resources and capabilities to develop innovations (Padmore *et al.*, 1998; Charterina et al., 2017). The current literature reflects the importance of external information as an origin of new ideas (Kim and Lui, 2015). External information can be considered as the acquisition of new and relevant information obtained from the relations of the firm with external agents such as customers, suppliers, competitors and institutions (Lane and Lubatkin,

1998). Firms today increasingly rely on their networks of external relations for innovation. Thus, companies frequently seek information about their customers, suppliers and competitors for the development of innovations (Moreira and Aguilar, 2014). Various studies highlight that the greater the external networks and the diversification of these networks, the greater is firms' innovation (Laursen and Salter, 2006, O'Connor, 2006).

Despite the existing studies, Kim and Lui (2015) point out that it is necessary to delve into the effect of external information in different types of innovation, since the contribution of innovation in business networks will be contingent upon the kind of innovation analysed. Although most of the existing studies have focused on analysing the effect that external information exerts on product innovation (e.g. Al-Laham *et al.*, 2010; Lin and Huang, 2012), this study analyses the role of external information through contacts with different agents in three types of innovation: product, organizational and marketing (Kim and Lui, 2015).

With regard to marketing innovation, several studies propose that business relationships with other organizations allow firms to obtain new and valuable information, enabling them to innovate in marketing programs or methods of product, price, promotion and place (Parra-Requena *et al.*, 2011). Relations with customers, suppliers and competitors provide information about the use of products, consumer preferences and existing production processes, while this kind of information is difficult to encode due to the tendency for it to be tacit knowledge (Sidhu *et al.* 2007). Thus, relations with contacts provide a company with the information needed to improve the design and packaging of products in order to adapt them to consumer preferences.

These external agents, through the information they provide about their valuation of products, help the company to establish the most adequate pricing policy, and facilitate the acceptance of products in the market (O'Connor, 2006). In this sense, contact with the different agents in the environment, especially with consumers, is an essential factor for the development of marketing innovation and, specifically, pricing policy (Moreira and Aguilar, 2014). This is because customers can provide information about both current and potential needs, thus becoming the most important source of innovation for companies (Padmore *et al.*, 1998; Moreira and Aguilar, 2014).

Furthermore, the acquisition of external information has a positive and significant influence on promotion and place innovations (Moreira *et al.* 2012). In this sense, external information provides a company with information about the best way to demonstrate to consumers why they need the firm's products and why they should be willing to pay a certain price for them, as well as the best way to deliver the products to the market.

Similarly, there is also specific evidence in this field of study showing that relations with customers have a positive influence on the ability of the company to innovate in marketing, thus becoming a key determinant for this type of innovation (Moreira and Silva, 2014). However, not all studies propose a clear relationship between these two variables. Thus, as previously mentioned, this external information is not always novel and relevant to marketing innovation, since it is sometimes biased towards other types of innovation and the closure of relationships with these agents generates redundancy, myopia, inertia and lock-in, as indicated in network theory (Nahapiet and Ghoshal, 1998; Hakansson and Ford, 2002).

Taking into account all these arguments, we consider that marketing innovation should not be understood merely as an isolated act, but rather as one that requires the existence of a network of contacts that promotes a dynamic process of learning through their interaction (Phong-Inwong and Ussahawanitchakit, 2011). Thus, the following hypothesis is proposed:

H1: External information has a positive influence on marketing innovation.

The role of product and organizational innovation

As noted above, network theory has identified information obtained from the firm's external sources as having a key role in innovation (O'Connor, 2006; Lin and Huang, 2012; Charterina *et al.*, 2017). However, very few studies have delved into the effect of external information on the different types of innovation; not only on

marketing innovation, as we have argued in the previous section, but also on product and organizational innovation (Shergill and Nargundkar, 2005).² Table 1 summarizes and provides a comparative overview of the main arguments and studies that justify the relationship between external information and each of the types of innovation addressed in the paper: marketing, product and organizational innovation.

[Table 1 Influence of external information [on types of innovation]]

The literature highlights external information coming from relationships with customers, competitors and suppliers as being a key antecedent of marketing innovation (Sidhu et al., 2007). However, other studies suggest that external relationships only generate marketing innovation if they are oriented towards developing other types of innovation that increase the expectations of successful marketing innovations (Schubert, 2010; Medrano and Olarte-Pascual, 2016). In addition, the literature on innovation highlights the interconnections between the different types of innovation (Damanpour and Gopalakrishnan, 2001). Specifically, the level of a firm's product and organizational innovation affects the level of marketing innovation (e.g. Ceylan, 2013; Merrilees et al., 2011; Medrano and Olarte-Pascual, 2016).

The influence of external information on the three types of innovation and the effect of organizational and product innovation on marketing innovation suggests that the effect of external information on marketing innovation can be mediated by organizational and product innovation. This study focuses on providing a better understanding of the ways in which firms transform external information into marketing, product and organizational innovation. Furthermore, the study proposes to delve into the confusing relationship between external information and marketing innovation, through its connections and coherence with other types of innovation such as product and organizational varieties. From this perspective, our study aims to determine whether product innovation and organizational innovation lead

² We contextualize the arguments that justify the relationship of external information on product and organizational innovation in mediating effects of the following sections.

external information towards marketing innovation. We address each of these mediating effects separately below.

The mediating effect of product innovation on the relationship between external information and marketing innovation

With regard to product innovation, both managers and researchers agree that companies must interact with the actors in the market -customers, suppliers, competitors and institutions- in order to obtain the necessary resources for the development of new products (Alam, 2003). Several studies show a direct relationship between having a network of contacts with various agents in the market and product innovation (Rothaermel and Deeds, 2006 and Partanen *et al.* 2014). When a company knows the needs of its customers, it is able to cover these needs more quickly and the risk associated with uncertainty by the introduction of new products into the market is reduced (Enkel *et al.*, 2009), thereby increasing orientation towards product innovation. Furthermore, the interaction of companies with agents in the environment to access information provides complementary capabilities and resources to develop new products (Vega-Jurado *et al.* (2015).

In this way, relationships with suppliers can provide expertise in viable ideas of design, raw materials, etc., which allows greater quality, flexibility, as well as efficiency and speed in the modifications and improvements of products and better adaptability to the market (Nieto and Santamaria, 2007). Furthermore, these relationships reduce risk and the time to deliver products, since they help the company to better understand the complex knowledge surrounding alternative products and related manufacturing practices (Ozer and Zhang, 2015).

Thus, external information can favour the emergence of new business opportunities, financial resources, and access to new markets, technologies and knowledge, as well as flexibility and credibility, which can promote the development of the various types of product innovation (Partanen *et al.*, 2014). Moreover, consumers can offer information about alternative product ideas and emerging market trends, current and future needs of customers, as well as new applications to products. In sum, a firm's interaction with

actors in the market will provide it with necessary information and resources to eliminate risks and identify opportunities to develop product innovations.

No studies have explicitly investigated the relationship between product innovation and marketing innovation (Gunday *et al.*, 2011). However, the literature indicates there is some level of mutual support between the two types of innovation. Thus, it is possible to consider that a firms' development of new products generates the need to create new marketing methods for these products, so the development of new product innovations positively influences the development of marketing innovations. Likewise, the development of new products can boost companies' entry to new markets and improve the chances of success of such products (e.g. OECD, 2005; Schubert, 2010; Ceylan, 2013).

The ideas presented in the preceding paragraphs suggest that the availability of external information is not a sufficient condition to lead a firm to generate greater marketing innovation. However, firms that leverage their external information to develop greater product innovation tend to exhibit higher marketing innovation. Thus, we consider product innovation as the key explanatory factor linking external information with a firm's marketing innovation. Product innovation is essential to transform the benefits of external information into higher marketing innovation. Furthermore, the existence of external information does not guarantee the transformation of the new knowledge into new marketing innovation. This is only the case if firms take advantage of the knowledge from their external relationships to generate product innovation that can boost their marketing innovation (Ceylan, 2013). Therefore, external information gives firms access to tacit knowledge, which is the basis for the development of product innovation needed to better address customer needs, opening up new markets, or newly positioning a firm's product in the market. Thus, product innovation drives firms to exploit external information effectively and generate higher marketing innovation.

In this way, access to external information has an indirect effect on marketing innovation through product innovation. Only when companies take advantage of their external information to generate product innovations, does such external information lead to marketing innovations. Therefore, it is expected that the effect of external networks on marketing innovation decreases or disappears due to the introduction of

product innovation in the model. Drawing on these arguments, the following hypothesis is proposed:

H2: Product innovation mediates the relationship between external information and marketing innovation.

The mediating effect of organizational innovation on the relationship between external information and marketing innovation

Organizational innovation refers to the introduction of changes in a company's managerial practices, processes and structure (Kim and Lui, 2015). The knowledge firms need to carry out organizational innovations tends to be tacit and complex, so is difficult to transmit (Mol and Birkinshaw, 2006; Ganter and Hecker, 2013). Thus, relations with consumers, competitors and suppliers are key for accessing the knowledge required to implement organizational innovations, since these agents have a wealth of information about developed practices and industrial processes (Kim and Lui, 2015). Therefore, relationships with external agents enable the improvement of a company's ability to manage and implement organizational processes.

In this vein, market contacts offer information on new managerial practices that companies can use, so it is possible to conclude that external information can provide operational knowledge that is critical to improve managerial processes such as interfunctional coordination or information systems (Mol and Birkinshaw, 2006; Al-Laham *et al.*, 2010).

Furthermore, relationships with consumers, competitors and suppliers allow access to diverse sources of information to avoid pressure to conform as regards a firm's structure and managerial practices. Thus, firms with diverse external relationships have a higher propensity to break with conventions and develop organizational innovation (Ruef, 2002).

Activities related to organizational innovation can help to facilitate responses to changes in the market, so this innovation may be related to marketing innovation (Armbruster *et*

al., 2008; Schubert, 2010; Medrano and Olarte-Pascual, 2016). Thus, organizational innovation would help to improve the capacity of the company to develop new forms of marketing for their products, which are essential in order to adapt to new market situations and to periods of uncertainty. Thus, several empirical studies show that the capabilities of a company to manage and implement organizational processes such as interfunctional coordination or information systems, affect the development of marketing innovation activities (e.g. Walker, 2008; Merrilees *et al.*, 2011; Ceylan, 2013). In this sense, it has been observed that organizational innovation activities favour the development of marketing innovation (Schubert, 2010).

Thus, the ideas posited above suggest that the availability of external information is not a sufficient condition to lead a firm to greater marketing innovation. As happens with product innovation, firms that leverage their external information to develop greater organizational innovation tend to exhibit marketing innovation. Therefore, we consider that organizational innovation is a key explanatory factor linking external information to a firm's marketing innovation. Organizational innovation is essential to transform the benefits of external information into higher marketing innovation. As previously stated, the existence of external information does not guarantee the transformation of new knowledge into new marketing innovation. It will only be the case if firms take advantage of knowledge from their external relationships to generate organizational innovation that can boost the development of firms' marketing innovation (Schubert, 2010). Therefore, external information gives firms access to high quality knowledge, which is the basis for the development of organizational innovation needed to encourage the development of new forms of marketing for their products. Thus, organizational innovation drives firms to effectively exploit external information to generate higher marketing innovation.

Therefore, it is expected that the effect of external information on marketing innovation decreases or disappears when organizational innovation is introduced into the model. Thus, the following hypothesis is proposed:

H3: Organizational innovation mediates the relationship between external information and marketing innovation.

Data and methodology

This study builds on the Spanish database *Technological Innovation Panel* (PITEC), which is a statistical instrument developed and maintained by the National Statistics Institute (INE) measuring the innovation activities of Spanish companies since 2003. This database is the Spanish version of the Eurostat Community Innovation Survey (CIS), a questionnaire that includes the Yale survey and the SPRU innovation database, and follows the guidelines of the Oslo Manual (OECD, 2005). Additionally, the Spanish version of the CIS includes more detailed questions on certain aspects of process innovation activities based on the guidelines of the Frascati Manual (OECD, 2002). PITEC classifies two types of innovation: technological innovation (product innovation and process innovation) and non-technological innovation (organizational innovation and marketing innovation). PITEC is published on the FECYT (Spanish Foundation for Science and Technology) website and is available to researchers. The database contains information from more than 12,000 companies and provides data from 2003 onwards. Some variables of the cohort have been anonymized in order to protect the identity of the companies.

This work uses the PITEC database for the year 2012, with a final sample of 994 manufacturing firms that used external information from suppliers, customers and competitors during the period 2010 to 2012, and conducted product innovation, organizational innovation and marketing innovation in the same period. Hence, this paper focuses on the analysis of the firms that have carried out these three types of innovations using this external information. Cases which lacked data on the variables used in the study have not been considered.

Variables

Dependent variable

The dependent variable measures the marketing innovation of the companies. PITEC defines marketing innovation as the implementation of new commercial strategies or concepts that significantly differ from preceding ones and have not been used previously. This implementation entails a significant change in the design or packaging of the product, in product-positioning (place), as well as in its promotion or its price

(4Ps). Seasonal changes, regular changes and other similar changes in the commercial methods are excluded. These innovations involve search for new markets, but not changes in the use of the product, which are excluded due to being considered product innovation. According to the PITEC guidelines, the database includes three items related to the importance of marketing innovation implemented by the company during the period 2010-2012: the growth or improvement of market share, the inclusion of products in new customer groups, and the inclusion of products in new geographical markets. The firm assesses the level of importance of marketing innovation carried out by the company in the period 2010-2012 by means of a 4-point Likert scale, scoring 1 if the firm considers marketing innovation was very important in the period 2010-2012, 2 if the level was medium, 3 for low significance and 4 if it was not considered relevant (the explanatory variables have been measured using the same scale). These variables are denominated *innmark1*, *innmark2* and *innmark3*, respectively in our work (Figure 1).

Explanatory variables

Regarding the explanatory variables, firstly, information obtained from the database in relation to the external information for the given innovation is used. The firm is asked to assess the significance of external information in improving the company's innovation activities during the period (2010-2012). The firm selects the sources from which it obtained external information. In order to assess the level of significance of the external information while innovating, this work uses the following variables: suppliers (*source1*), customers (*source2*) and competitors (*source3*).

Secondly, the survey defines product innovation as a new product, or one that is substantially improved, being launched in the market. Product innovation must be based on the results of new technological developments, new combinations of existing technologies or on the utilization of other knowledge acquired by the company. Changes of an aesthetic nature, the mere sale of innovations produced entirely by other companies, and simple changes in organization or administration, should not be included. Product innovation is always something new for the company although it does not have to be new in the market in which the company operates. The survey assesses the innovative activity of the company, in the reference period, as the level of significance of different objectives while innovating. This work uses the variables

concerning the objectives focused on product innovation to increase the product range (*innprod1*), to introduce new products (*innprod2*), to increase the sales of new products with regard to competitors (*innprod3*) and to improve product quality (*innprod4*).

Thirdly, organizational innovation is defined in the PITEC survey as the implementation of new organizational methods in the internal operations of the firm (including methods and systems of knowledge management), in the organization of the workplace, or in external relations that the firm has not previously used. Organizational innovation must be the result of strategic decisions carried out by the management staff of the company. This excludes mergers or acquisitions of other companies, although these do imply some level of organizational novelty for the firm. The survey requires the firm to assess the organizational innovations performed in the reference period by means of the level of significance of the organizational innovation objectives while innovating. The present work uses the following variables: reduction of the response period to customer or supplier needs (*innorg1*), the improvement of the ability to develop new products or services (*innorg2*), improvement of the quality system of the firm (*innorg3*) and reduction of costs per manufactured unit (*innorg4*).

Control variables

Age, size, technology sector, technological uncertainty, market uncertainty, competitive rivalry and demand uncertainty have been included as control variables. Age is a typical control variable in works on innovation (Rhee *et al.*, 2010). It is measured as the natural logarithm of the difference between the survey year (2012) and the year of the firm's creation. Size is measured as the natural logarithm of the number of employees. In order to classify the sample according to the technology sector, and following the OECD classification, dummy variables are defined indicating whether the firm belongs to a low-tech industry (*liti*, variable which takes the value 1 if the firm belongs to the following sectors: food, beverages and tobacco, textile and clothing, wood products, paper and printing), to a low-medium-tech industry (*lmti*, variable which takes the value 1 if the firm belongs to the following sectors: petroleum refining, rubber and plastic products, non-metallic mineral products, ferrous metals, non-ferrous metals, shipbuilding and other manufacturing), to a medium-high industry (*mhti*, variable which takes the value 1 if the firm belongs to the following sectors: chemicals, non-electrical machinery, electrical machinery, scientific instruments, motor vehicles and other

transport equipment) or to a high-tech industry (*hti*, variable which takes the value 1 if the firm belongs to the following sectors: pharmaceutical products, computer, electronic and optical products, and the aerospace industry). Finally, technological uncertainty (*Tec_unc*), measures the lack of information about technology; market uncertainty (*Mkt_unc*) measures the lack of information about the market; competitive rivalry (*Comp_riv*) measures the degree of market domination established by the companies; and demand uncertainty (*Dem_unc*) measures the uncertainty of the market with respect to the demand of new products or services. These variables have been assessed by means of a 4-point Likert scale, measuring the degree of importance of these factors as obstacles for the firm while innovating, from 1 if the firm considers it was very important, 2 if considered medium, 3 for low significance and 4 if it was not considered relevant.

Analysis and method

The data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). According to Haenlein and Kaplan (2004), it is more appropriate than traditional multivariate techniques for works like the present one, and has several advantages. First, it is possible to analyse the firm's data and simultaneously confirm that the model has sufficient reliability and validity in all the constructs. Secondly, due to the fact that PLS requires no assumptions with respect to multivariate normality, it simplifies the analysis more effectively than performing structural equation models based on covariance. Thirdly, PLS allows a large number of variables to be handled and, furthermore, the analysis of complex constructs (Tenenhaus, 2008). Fourthly, SEM techniques are highly useful for analysing the mediation hypothesis (James *et al.*, 2006). Several studies can be found supporting the use of PLS in Fang *et al.* (2014).

The methodology applied to the present work consisted of the assessment of the measurement model in a first step followed by the evaluation of the structural model. The measurement model was analysed to test its reliability and validity by means of the evaluation of individual item reliability, composite reliability of the constructs, convergent validity, and discriminant validity. The structural model was used to evaluate the independence between the variables, so predicting the consistency of the relationships defined in the hypotheses. In order to confirm the direct effects between the latent variables, the estimation of *t*-statistics and *p*-values were calculated by means

of the bootstrapping method. Next, the Stone-Geisser test (Geisser, 1974; Stone, 1974) was used to measure the predictive relevance of the dependent constructs. This followed a Blindfolding procedure (Tenenhaus *et al.*, 2005), where part of the data for a particular construct was omitted during the estimation of the parameters, so that the estimation of the omitted parameter could be conducted using the estimative parameters (Chin, 1998). Finally, to assess the predictive relevance of the model, the cross-validated redundancy Q^2 was calculated, showing that the model has predictive relevance if Q^2 is greater than zero (Henseler *et al.*, 2009).

Another requirement was the evaluation of the correlation between the latent variables, as shown in Table 2.

SmartPLS 2.0 was used to analyse the data and to perform a bootstrap re-sampling procedure (500 subsamples) in order to determine the level of statistical significance of the coefficients.

[Table 2 Correlations matrix]

Results

Assessment of the measurement model

First, in order to guarantee the validity of the measurement model, it was necessary to evaluate item reliability, construct reliability, convergent validity and discriminant validity. Item reliability was tested by means of the value of the loadings (λ). The proposed model has a high level of item reliability (Figure 1), since loadings greater than 0.707 were obtained (Chin and Newsted, 1999). The results of the analysis of the composite consistency of each construct, measured by means of Cronbach's alpha, are shown in Table 3. All the constructs have a strict reliability, since the value is higher than 0.8. Convergent validity was evaluated by means of the average variance extracted (AVE) with values higher than the recommended value of 0.5 for the four constructs (Table 3).

[Table 3 Reliability measurements]

Discriminant validity was assessed by comparing the square root of the AVE values and the correlations between constructs. Results show that each construct is associated with itself more strongly than with the other constructs, since values do not exceed the square root of the AVE value (Table 4).

[Table 4 Discriminant validity]

In addition, we also performed cross-loading analysis to check that each construct was measuring a different effect. Cross-loading guarantees that each item of the different constructs measures what it is supposed to measure, and there are no cross-loading problems between the variables. Table 5 shows these results.

[Table 5 Cross-loading]

Once the assessment of individual item reliability, composite reliability of the constructs, convergent validity and discriminant validity were completed, it was possible to guarantee the validity of the research model and affirm that it was a good measurement model and could be assessed with sufficient confidence.

Assessment of the structural model

Hypothesis 1 establishes the direct effect of external information on marketing innovation. The results obtained show a positive and significant relationship between external information and marketing innovation ($\beta=0.237$, $p<0.05$), so H1 can be accepted. Hypotheses 2 and 3 propose the existence of mediating effects of product innovation and organizational innovation in the relationship between external information and marketing innovation. In order to confirm these hypotheses, we evaluated the structural model that includes all the variables together. The bootstrapping process determines whether the mediation effect exists and we can establish this effect in the mediation tree proposed by Zhao, Lynch and Chen (2010).

First, product innovation as a mediator variable was evaluated. When dependent, independent and mediator variables are introduced in the same model, the data obtained show that the effect of external information on marketing innovation is totally eliminated ($\beta=0.094$, *non-significant*). The effect of external information on product

innovation ($\beta = 0.469, p < 0.001$) and the effect of product innovation on marketing innovation ($\beta = 0.319, p < 0.001$) are significant, corroborating a full mediator effect. Therefore, H2 can be accepted. Following Zhao, Lynch and Chen (2010) this type of mediation can be called indirect-only mediation, since the mediated effect exists, but no direct effect.

A similar assessment to corroborate the mediating effect of organizational innovation was also performed. The effect of external information on organizational innovation ($\beta = 0.223, p < 0.01$) and the effect of product innovation on marketing innovation ($\beta = 0.357, p < 0.001$) are significant. Thus, it is possible to affirm there is a partial mediation effect of organizational innovation in the relationship between external information and marketing innovation. Therefore, Hypothesis 3 can be accepted. Following Zhao et al. (2010) this type of mediation can be called complementary mediation, since a mediated effect and direct effect both exist and point in the same direction.

In addition to the outcomes explained, the results reveal a new finding when the two mediator effects operate jointly at the same stage in the model, such that there are two indirect effects linking external information with marketing innovation once the two mediator variables are considered. The results denote that, once both mediator effects are incorporated at the same time, the initial direct effect is totally eliminated ($\beta = 0.072, non\text{-}significant$) and the previously displayed individual effect of each mediator is reinforced. These results emphasize the combinative effect of both innovations -product innovation and organizational innovation-, improving the mediator effect between the external information and marketing innovation to a greater extent than the individual effect of each one.

The results of the direct, indirect and mediator effects between the variables are shown in Figure 1 and Table 6.

[Figure 1 Model results]

[Table 6 Effects of external information on marketing innovation]

Additionally, tests were performed to verify the consistency, goodness of fit (GoF) and predictive relevance of the model. With respect to model consistency $-R^2$ value of the dependent variable- the model explains 22.9% of the total variance of the firm's marketing innovation, higher than the threshold of 0.1 determined by Falk and Miller (1992). The goodness of fit (GoF) index was evaluated according to the method of Tenenhaus *et al.* (2005). This criterion determines the square root of the average of AVE of the latent variables with reflective indicators multiplied by the average of the R^2 of the dependent variables. This value in our model is 0.376; hence, the model has a good fit. Finally, the Stone-Geisser test to measure the predictive relevance of the dependent construct was implemented following a blindfolding procedure. The value of the Cross-validated redundancy, Q^2 , is 0.132, higher than zero. Therefore, the model also has sufficient predictive relevance.

Discussion and conclusions

This empirical research aimed to highlight the way in which companies obtain marketing innovation from external information by means of product innovation and organizational innovation as mediator effects, in a large sample of manufacturing firms. The results highlight that the development of product and organizational innovations are significant drivers for companies to use external information as a key factor to successfully achieve marketing innovation and, by extension, to obtain a sustainable, competitive advantage (Ren *et al.*, 2010). These findings show that companies guiding external information through product and organizational innovations could be more likely to innovate in marketing.

With regard to product innovation as a mediator construct, we found that it has a full mediating effect (indirect-only mediation) between external information and marketing innovation. The results show that the initial direct effect of external information on marketing innovation disappears in its entirety once the firm develops product innovation. This finding shows a way for companies to achieve marketing innovation and, as result, sustainable and competitive advantages once external information is used to develop technological innovation and is subsequently adopted by marketing innovation to obtain significant improvements in product design or packaging, product placement, or pricing (OECD, 2005). It is apparently an indicator for the companies to

improve marketing innovation when external knowledge is previously used to develop technological innovation. This finding shows a new relation between product and marketing innovations that has not been made explicit before in the literature. Furthermore, this could help explain the connection with the literature on marketing wherein some authors consider marketing innovation as incremental in nature (Grewal and Tansuhaj, 2001; Naidoo, 2010) and could additionally shed some light on businesses that are so blinded by technological innovation that they fail to achieve competitive advantages through marketing innovation (Ren *et al.*, 2010).

In the analysis of organizational innovation as a mediator construct, some findings can also be highlighted from the results. First, the model shows a partial mediating effect (complementary mediation) of organizational innovation between external information and marketing innovation. It is not a full effect, like the product innovation mediating effect, but reflects the significance of organizational innovation in achieving marketing innovation using external information. The first conclusion we must draw from this is that the finding of this kind of mediation suggests the possibility of an omitted mediator in the direct path, and further research in this line should be conducted. Furthermore, this result shows that companies can use external information to achieve marketing innovation by means of the development of organizational innovation, but this is not a prerequisite as is the development of product innovation. This finding has not been previously considered in the literature, where little attention has been paid to the relationship between non-technological innovations (e.g. the study by Fabling (2007) highlighting that companies are successful when they invest in these types of non-technological innovations). Second, the results complement the previous studies by Ceylan (2013), Merrilees *et al.* (2011), Schubert (2010) and Walker (2008). These studies analyse a company's capabilities to implement organizational processes, and how information affects the development of marketing innovation activities. Our research explains more clearly the relationship between these elements and the way to reach competitive advantages through organizational innovation, as a desirable prior step to develop marketing innovation.

Another significant finding is that once all variables are introduced in the model, the combined mediator effect of both product innovation and organizational innovation is strengthened, with a higher full mediator effect. This finding not only reinforces the role

of both product innovation and organizational innovation as mediator variables, but also provides evidence of the interrelationship between the three types of innovations (Walker, 2008; Gunday *et al.*, 2011; Ceylan, 2013), and the influence that both combined effects have in driving external information to achieve marketing innovation.

Finally, the results also allow us to clarify the ambiguity in the current literature about these relationships, indicating that driving external information through product and organizational innovation could help companies to take advantage of marketing innovation. It explains why firms often turn to suppliers, customers and competitors to look for information and knowledge with which to perform their innovative activities (Moreira and Aguilar, 2014).

Our study is based on the traditional theoretical connection between network theory and innovation literature, focusing on an aspect widely called for although barely reported in the literature. Specifically, we contribute to explaining the effect of external information from networks on innovation marketing through other types of innovation. Thus, this work expands the literature on marketing innovation determinants, addressing the current deficiency in this field as described by some authors (Halpern, 2010; Camisón and Villar-López, 2011). Furthermore, the current work responds to the lack of theoretical and empirical studies concerning marketing innovation and its relationship with other innovation areas, as suggested by a number of authors (Walker, 2008; Gunday *et al.*, 2011; Ceylan, 2013) who have highlighted the need to move forward in this line of research. This approach helps reconcile the literature of innovation and marketing, seeking a meeting point in largely separate ways (Camisón and Villar-López, 2011). In addition, this research contributes to reinforce, conceptually and empirically, the differentiation between the types of innovation, as demanded by different authors (Kim and Lui, 2015). Finally, the study has a cross-sectoral approach that includes a wide sample of firms from different technology industries to overcome other studies which focus on small samples of a single sector.

Implications for management

Our research has several managerial implications. Marketing innovation provides firms with a way of differentiating themselves from their competitors and reaching competitive advantages. As highlighted by Medrano and Olarte-Pascual (2016), taking

advantage of the early stage of marketing innovation as a managerial practice, companies should leverage this situation in order to be more competitive. Therefore, it is important that managers have information about the practices that drive this type of innovation. To do this, managers must bolster their training in marketing innovation and strengthen their skills in marketing practices, identifying and including marketing goals in the firm's strategy, and making them known to all the company.

The results obtained show that a key managerial task is to take advantage of external information to develop innovative products that encourage firms to develop new methods of promotion, advertisement, price-establishing criteria, product packaging and commercial distribution. Therefore, firms must focus on relationships with their contacts (suppliers, customers and competitors) to obtain relevant information about alternative product ideas and emerging customer needs to develop relevant product innovations. To achieve this, the integration of suppliers and customers in the new product development process, by means of the concurrent engineering or another systematic approach, is a well proven practice that helps to achieve product innovations in a more efficient and successful way. In addition, relationships with competitors could be strengthened by using the opportunity of conferences, exhibitions, seminars, business associations and business networks to boost the interchange of ideas and information and to promote new ways of cooperation between firms.

Managers should also take advantage of external information from their contacts in order to introduce changes in information systems, interfunctional coordination and organizational processes because these types of innovations will drive the external information obtained towards the development of marketing innovations. Thus, managers should search for information from their contacts to develop organizational improvements that encourage firms to introduce new sales channels, new pricing policies and new promotion techniques. To achieve this, firms should consider customers and suppliers as part of their organization, boosting their participation in the day-to-day of the company. This enables the company to obtain valuable information that could help to make the most effective decisions about organizational changes, use of information systems, and coordination between the different functions and with their stakeholders. In addition, the relationship with competitors by means of business

networks and events could identify new organizational practices, methods and updated tools that the company could utilize to achieve marketing innovations.

Therefore, we recommend that managers analyse their external information to identify opportunities for product and organizational innovations, using their relationships with suppliers, customers and competitors to develop marketing innovations. In short, managers must conceive marketing innovation differently. Thus, they need to promote business programs that encourage innovation, adapted to the different types of innovation.

Finally, managers should avoid the closure of relationships with external agents and should be more open to new contacts in order to avoid redundancy, myopia, inertia and lock-in. Thus, avoiding these problems of closure and directing this external information towards product and organizational innovation, companies will help develop marketing innovations. In summary, the most appropriate way for companies to obtain efficient marketing innovation is to be proactive in obtaining relevant external information from diverse customers, competitors and suppliers, focused on developing new or significantly modified products and relevant organizational innovations. This context facilitates and encourages the development of strong marketing innovations.

Limitations and future research

Though all possible precautions were taken, this research work still has some limitations. First, the study proposes a cross-sectional approach, although the variables concerning the innovative activities of the companies cover the information over a 3-year period (2010 to 2012 in our study). Moreover, this study was subject to certain limitations because of the use of a pre-prepared database (PITEC). In this sense, we were unable to work with all the variables we would have liked or to measure the different types of innovation in what we consider the ideal way. We had to adapt our work to how the different variables included in the study are measured in this database. In any event, we believe that the information obtained from PITEC suffices for the proposed aims, having already been put to good use in other studies on marketing innovation, such as in Medrano and Olarte-Pascual (2016).

In addition, several avenues for future research open up after this study. First, it would be interesting to develop a new analysis to study the evolution of the relationships covering other periods of time both before and after the Spanish economic crisis. Second, evidence on how the companies use these relationships in other countries might be revealing. The work provides evidence about the influence of external networks on product and organizational innovation, supporting the results obtained by Kim and Lui (2015) and also about the relationship between different types of innovation, in line with Govindaraju *et al.*, (2013), but it would be interesting to verify whether the complete proposed model is also supported by other databases from different countries.

Furthermore, this study has been tested in manufacturing companies. We consider that it would also be interesting to test this model in service companies, in order to compare the results and to determine whether the specific characteristics of service companies have an influence on the way in which companies lead information from external contacts to marketing innovation.

Finally, in line with the findings, it would be interesting to include other potential mediators, omitted in this study, which might explain the partial mediation. Thus, we propose studying the role of dynamic capabilities, as suggested by Makkonen, Pohjola, Olkkonen and Koponen (2016), on the relationship between external information and marketing innovation.

Acknowledgment

The researchers acknowledge the support of the Spanish Ministry of Economy and Competitiveness through the research projects ECO2013-42387-P and ECO2016-75781-P.

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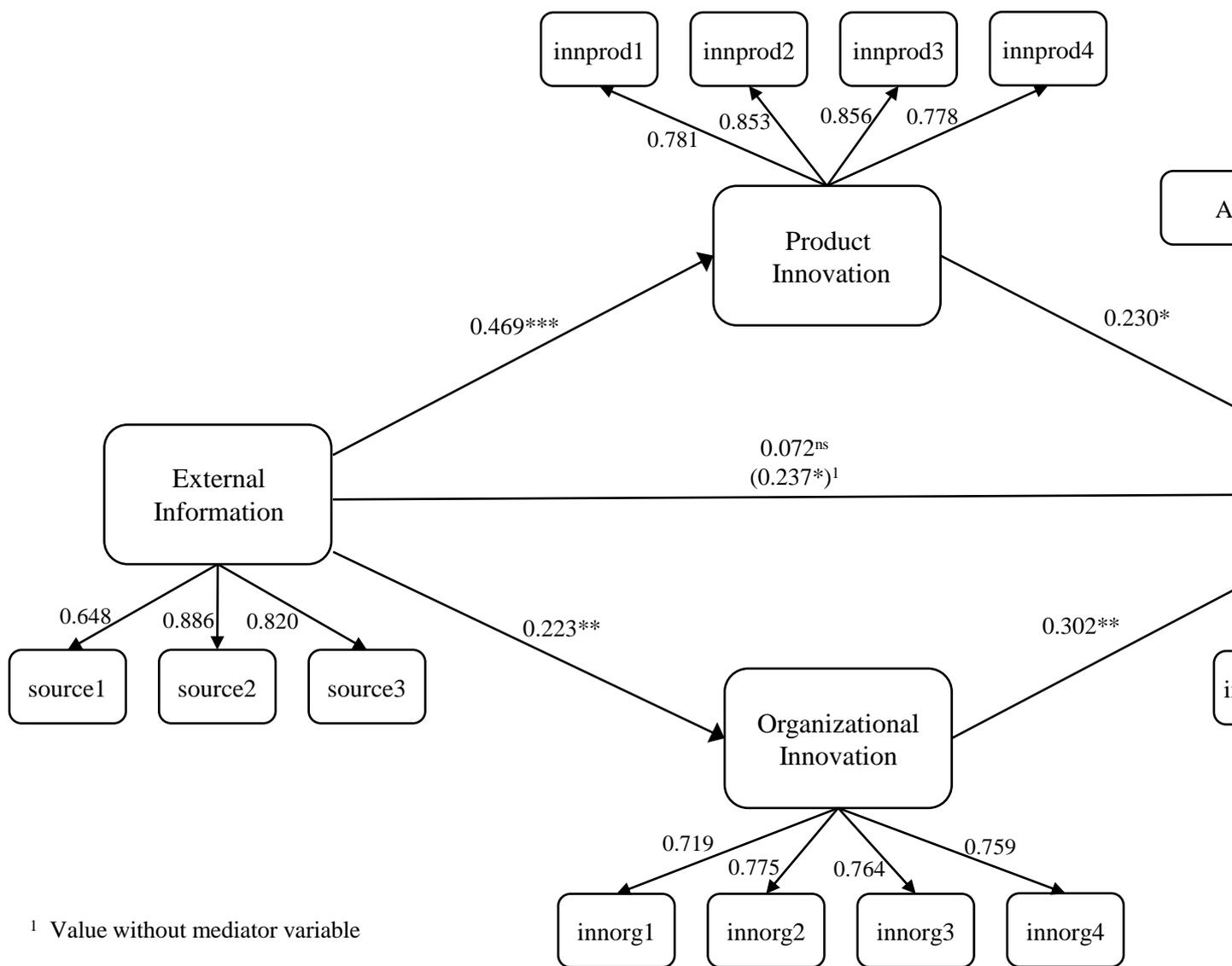
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¹ Value without mediator variable

Figure 1. Model results

Table 1 Influence of external information on types of innovation

Influence of external information on Marketing innovation	<ul style="list-style-type: none">-Provides information about the use of products, consumer preferences and production processes (Sidhu et al. 2007)-Helps to establish the most adequate pricing policy (O'Connor, 2006; Moreira and Aguilar, 2014)-Provides information about current and potential needs of customer (Padmore et al., 1998)-Influence on promotion and place innovations (Moreira et al. 2012)
Influence of external information on Product innovation	<ul style="list-style-type: none">-Helps to cover customer needs more quickly and reduce the risk associated with uncertainty about the introduction of new products into the market (Enkel et al., 2009)-Provides complementary capabilities and resources to develop new products (Vega-Jurado et al., 2015)-Emergence of business opportunities which can promote the development of product innovation (Partanen et al., 2014)-Better quality, flexibility, efficiency and speed in the development of new products (Nieto and Santamaria, 2007; Ozer and Zhang, 2015)
Influence of external information on Organizational innovation	<ul style="list-style-type: none">-Offers information on new managerial practices (Al-Laham et al., 2010)-Allows access to rich information about developed practices and industrial processes (Kim and Luis, 2015)-Provides operational knowledge, that is critical to improve managerial processes (Mol and Birkinshaw, 2006)-Avoids pressure to conform as regards a firm's structure and its managerial practice (Ruef, 2002)

Table 2 Correlations matrix

<i>Construct</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Market Inn	1													
2 Ext. Inf.	0.249	1												
3 Org Inn	0.398	0.223	1											
4 Prod Inn	0.372	0.469	0.337	1										
5 Age	0.019	0.043	0.040	0.034	1									
6 Size	-0.002	-0.060	-0.041	-0.025	0.332	1								
7 hti	-0.060	-0.089	-0.083	-0.090	-0.078	-0.019	1							
8 mhti	-0.042	-0.040	0.008	-0.069	0.029	-0.073	-0.284	1						
9 lmti	0.048	0.006	0.037	0.035	-0.010	0.016	-0.184	-0.387	1					
10 lti	0.045	0.099	0.018	0.106	0.033	0.076	-0.244	-0.515	-0.333	1				
11 Tec_unc	0.049	0.092	0.033	0.076	0.059	0.087	0.014	0.021	-0.030	-0.006	1			
12 Mkt_unc	0.043	0.133	0.043	0.097	0.016	0.097	-0.027	-0.022	0.034	0.012	0.683	1		
13 Comp_riv	0.093	0.125	0.081	0.154	-0.009	0.101	-0.075	-0.089	0.062	0.092	0.314	0.389	1	
14 Dem_unc	0.096	0.106	0.074	0.145	0.005	0.110	-0.068	-0.020	0.045	0.030	0.291	0.358	0.595	1

Table 3 Reliability measurements

<i>Construct</i>	<i>Construct reliability</i>	<i>AVE</i>	<i>Cronbach's α</i>	<i>Redundancy</i>
External Information	0.832	0.626	0.701	
Product Innovation	0.890	0.669	0.835	0.146
Organizational Innovation	0.840	0.569	0.748	0.028
Marketing Innovation	0.858	0.670	0.751	0.020

Table 4 Discriminant validity

<i>Construct</i>	<i>External Inf.</i>	<i>Product Innovation</i>	<i>Organizational Innovation</i>	<i>Marketing Innovation</i>
External Information	0.791			
Product Innovation	0.469	0.818		
Organizational Innovation	0.223	0.337	0.754	
Marketing Innovation	0.237	0.372	0.398	0.818

Table 5 Cross-loading

	Marketing Innovation	External Information	Organizational Innovation	Product Innovation
innmark1	0.74891	0.20007	0.31419	0.26940
innmark2	0.87038	0.22374	0.34373	0.31863
innmark3	0.83032	0.18765	0.31867	0.32244
innorg1	0.26654	0.18622	0.71926	0.22627
innorg2	0.33321	0.18205	0.77504	0.32523
innorg3	0.27988	0.13294	0.76418	0.24141
innorg4	0.31443	0.16905	0.75853	0.21737
innprod1	0.25600	0.37063	0.22499	0.78126
innprod2	0.35825	0.42987	0.27859	0.85337
innprod3	0.33540	0.39259	0.30558	0.85591
innprod4	0.25088	0.33343	0.29606	0.77812
Source1	0.12140	0.64750	0.14946	0.26133
Source2	0.24411	0.88615	0.21744	0.46402
Source3	0.20374	0.82041	0.15395	0.35435

Table 6 Effects of external information on marketing innovation

<i>Construct</i>	<i>without mediators</i>	<i>with product innovation</i>	<i>with organizational innovation</i>	<i>final model</i>
External Information	0.237*	0.094 ^{ns}	0.164*	0.072 ^{ns}
Age				-0.012 ^{ns}
Size				0.019 ^{ns}
Low Tech.				0.007 ^{ns}
Low-medium Tech.				0.025 ^{ns}
Medium-high Tech.				-0.012 ^{ns}
High Tech.				-0.004 ^{ns}
Tech. Turbulence				0.032 ^{ns}
Environmental				-0.004 ^{ns}
Market1				0.006 ^{ns}
Market2				0.030 ^{ns}
R ²	0.072	0.150	0.192	0.229