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Absorbing knowledge from supply-chain, industry and science: The distinct moderating role of formal liaison devices on new product development and novelty

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ABSTRACT

Building on open innovation literature and recent developments within absorptive capacity research, this paper addresses if the use of formal liaison devices by firms differently influences the effects of external knowledge acquisition from suppliers, customers, competitors and universities on new product development and novelty of new products. The results of a survey of 248 Spanish industrial high-tech firms show that whereas the use of these mechanisms positively moderates the relationship between knowledge acquisition from suppliers and competitors and new product development, they negatively moderate the effect of knowledge acquisition from universities and have no effect on knowledge acquired from customers. On the other hand, the use of these devices negatively moderates the relationship between knowledge acquisition from suppliers and novelty of new products, and has no effect on the knowledge acquired from customers, competitors and universities. Moreover, knowledge acquisition from universities has a direct negative effect on novelty. Contribution of these findings to open innovation and absorptive capacity research is discussed.

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1. Introduction

Recently in marketing and management research, it has stressed the role of learning from external sources as a key means for obtaining new valuable ideas for the innovation process (e.g. Berghman, Matthysens, & Vandenbempt, 2012; Chen, Chen, & Vanhaverbeke, 2011; Chen, Lin, & Chang, 2009; Chesbrough, 2003; De Luca & Atuahene-Gima, 2007; Laursen & Salter, 2006; Zhang, Hoenig, Di Benedetto, Lancioni, & Phatak, 2009). Although, as posited by Lancioni and Chandran (2009), “many industrial firms paid little attention to the topic, since it was felt that knowledge was easily handled internally and was a simple process” (p. 148), this purely internal view of innovation has been increasingly fading as recent literature has highlighted the merits of acquiring external knowledge and moved from ‘research and develop’ towards ‘connect and develop’ (Grimpe & Sofka, 2009; Huston & Sakrab, 2006).

This phenomenon has resulted in a gradual replacement of the traditional hermetic model by an open innovation model. Whereas in the traditional, ‘close model’, firms produce, develop and commercialize their own ideas (Tether & Tajar, 2008), the new open innovation

model relies on the notion that a single organization cannot successfully innovate in isolation (Dahlander & Gann, 2010). According to this approach, external knowledge acquisition becomes critical since it complements and renews knowledge stocks available within the organization. Thus, firms should become more permeable and engage in flexible networks with different external agents in order to increase their innovative capability (Chesbrough, 2003; Laursen & Salter, 2006).

Although open innovation is a relatively new label and has become one of the hottest topics in recent literature, the use of externally generated knowledge to improve internal resources and innovation processes is not new (Huizingh, 2011). In this regard, open innovation exhibit important connections with more classic approaches within innovation management and marketing research, such as R&D cooperation (e.g. Fritsch & Franke, 2004; OECD, 2005), market orientation (e.g. De Luca & Atuahene-Gima, 2007; Kohli & Jaworski, 1990), or supply chain management (e.g. Groen & Linton, 2010; Lambert & Cooper, 2000). In fact, some critics have asserted that open innovation is old wine in new bottles (Trott & Hartmann, 2009).

Despite the above, open innovation has long contributed to the great proliferation of empirical works which investigate how knowledge acquisition from different external sources affects firms' innovation performance (e.g. Amara & Landry, 2005; Leiponen & Helfat, 2011; Murovec & Prodan, 2009; Nieto & Santamaría, 2007; Sofka & Grimpe, 2010; Tödtling et al., 2009; Tsai & Wang, 2009; Yu, 2013; Zhang et al., 2009). However, these studies offer mixed results and do not enable reaching a clear conclusion about which external knowledge sources

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are more relevant in order to reach different innovation outputs, such as new product development or novelty of product innovation.

One possible explanation for this absence of consensus might be that, although external knowledge acquisition is necessary, mere exposure to external knowledge is not enough to increase the innovation capability of a firm (Voudouris, Lioukas, Iatrelli, & Caloghirou, 2012). Following this reasoning, “firms exposed to the same amount of external knowledge flows might not derive equal benefits” (Escribano, Fosfuri, & Tribó, 2009, p. 97) because once external knowledge is acquired by a firm, it is necessary to assimilate and integrate it with organizational knowledge base (Todorova & Durisin, 2007). Therefore, “besides the external relationship learning, companies need to have the internal capability–absorptive capacity to enhance their innovation performance” (Chen et al., 2009, p. 152). Nevertheless, in spite of the great theoretical advance in the field of absorptive capacity (Cohen & Levinthal, 1990; Lane, Koka, & Pathak, 2006; Lewin, Massini, & Peeters, 2011; Lichtenthaler & Lichtenthaler, 2009; Todorova & Durisin, 2007; Van den Bosch, Volberda, & de Boer, 1999; Volberda, Foss, & Lyles, 2010; Zahra & George, 2002), this theoretical richness has not been translated into empirical studies, which have generally tended to associate this concept to R&D expenditures (Lane et al., 2006; Volberda et al., 2010). Yet, absorptive capacity does not only depend on R&D investments, but also on several other organizational attributes (Easterby-Smith et al., 2008).

In this regard, recent developments in the field of absorptive capacity have begun to underline the key role that organizational mechanisms may play in developing this capacity (e.g. Foss, Laursen, & Pedersen, 2011; Lewin et al., 2011; Volberda et al., 2010). However, empirical analyses of the organizational antecedents of absorptive capacity are very scarce (Berghman et al., 2012; Foss et al., 2011; Jansen, Van den Bosch, & Volberda, 2005). This scarcity is remarkable if we take into account that, in their seminal contribution, Cohen and Levinthal (1990) highlighted the relevance of organizational mechanisms for external knowledge absorption. As posited by these authors, “it is therefore useful to consider what aspects of absorptive capacity are distinctly organizational. (...) An organization's absorptive capacity does not simply depend on the organization's direct interface with the external environment. It also depends on transfers of knowledge across and within sub-units that may be quite removed from the original point of entry” (p. 131–132).

Further, some recent contributions have claimed that future studies should empirically investigate not only the factors that increase firm's absorptive capacity, but also those that influence its nature and outcomes (Nag & Gioia, 2012; Zhou & Li, 2012). Here, empirical evidence on the exploratory versus exploitative nature of absorptive capacity is anecdotal and is limited to case studies (Van den Bosch et al., 1999). Therefore, quantitative research which investigates how distinct organizational mechanisms influence the exploratory–exploitative orientation of absorptive capacity is needed.

This paper tries to address these gaps in previous literature by analyzing the role played by formal liaison devices in the process of knowledge absorption from the four more salient external sources according to previous research, i.e. suppliers, customers, competitors and universities. Formal liaison devices are defined as structures and formal processes purposefully deployed by the organization to facilitate the capture, analysis, interpretation, and combination of the knowledge located dispersedly within it (De Luca, Verona, & Vicari, 2010; Jansen, Tempelaar, Van den Bosch, & Volberda, 2009; Jansen et al., 2005). Specifically, we propose and test hypotheses to investigate how the use of these formal devices distinctly moderates the effect of knowledge acquisition from the four external sources on firm's new product development and novelty of new products. This way, firstly, we try to isolate the above-mentioned assimilative role of absorptive capacity (Escribano et al., 2009) by studying the moderating effect of one of its proposed organizational antecedents (see Jansen et al., 2005) on the relationship between external knowledge flows and innovation

performance variables. On the other hand, by focusing on new product development and novelty of new products as two distinct dependent variables, we are able to address how this organizational mechanism contributes to develop an exploitative oriented absorptive capacity which result in incremental improvements of the firm's new product portfolio or, by contrast, it leads to the development of an explorative nature of absorptive capacity, so giving rise to more novel innovations.

Results based on survey data from 248 Spanish firms operating in high-technology industrial sectors show that, as expected, the moderating role of formal liaison devices differs based on the degree of novelty characterizing new products. However, its effectiveness as organizational mechanisms for absorbing external knowledge varies dramatically depending on the external source from which firms draw on.

The paper is structured as follows. Below, we offer a synthesis of literature review on open innovation and absorptive capacity and present the proposed hypotheses. After that, sampling frame, data collection procedures and measures of variables are explained. Then, we present the empirical findings, and conclude with a discussion of main results, implications for research and practice, and future research directions.

2. Literature review and hypotheses

2.1. External knowledge sources and innovation outputs

Firms can acquire knowledge from a wide range of external sources (see for example Chen et al., 2011; Chiang & Hung, 2010; Laursen & Salter, 2006; Leiponen & Helfat, 2010, 2011; OECD, 2005; Tether & Tajar, 2008). Among them, suppliers, customers and competitors appear to be the most used by industrial firms (Laursen & Salter, 2006) and have received more attention by academics (De Luca & Atuahene-Gima, 2007; De Luca et al., 2010; Droge, Calantone, & Harmancioglu, 2008; Zhang et al., 2009; Zhou & Li, 2012). After them, universities have recently appeared as the fourth most used and studied source (Boehm & Hogan, 2013; Chen et al., 2011; Lundberg & Andresen, 2012).

These four external sources were proposed by von Hippel (1988a) in which is considered the seminal work on open innovation. Since then, several authors have focused their efforts on investigating these four sources (e.g. Alegre & Chiva, 2008; Grimpe & Sofka, 2009; Nieto & Santamaría, 2007; Tether, 2002; Tsai & Hsieh, 2009; Tsai & Wang, 2009; Un, Cuervo-Cazurra, & Asakawa, 2010). According to their relevance both for firms operating in industrial markets and previous research, the present paper analyzes external knowledge acquisition from suppliers, customers, competitors and universities.

Each of these external sources may incorporate new knowledge to the organization which complements its already available knowledge base. In this sense, customers are considered a valuable source of information about market trends which may lead firms to anticipate opportunities (Tether, 2002). In marketing research, market knowledge also refers to the firm's knowledge about its competitors (De Luca & Atuahene-Gima, 2007; Kohli & Jaworski, 1990). Besides, some authors have also underlined the relevance of competitors as providers of complementary technological knowledge (Tödtling et al., 2009). Along with customers, suppliers are part of the firm's supply-chain. But, due to their upstream position, they incorporate more technological than market knowledge (Tether, 2002; Tsai & Hsieh, 2009). Finally, knowledge generated in universities is characterized by its scientific and technological nature, high novelty, and a great future potential (Boehm & Hogan, 2013; Tsai & Wang, 2009).

Previous research has devoted considerable efforts in order to identify those external sources having a higher effect on firm's innovativeness and ability to develop more novel products. In this regard, Kaufmann and Tödtling (2001) found that cooperation with technological partners (universities and suppliers, in this order) is more important than cooperation with the firms' customers (which has no

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