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Knowledge management and innovation in knowledge-based and high-tech industrial markets: The role of openness and absorptive capacity

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ABSTRACT

Knowledge, as resource, and technological innovation, as a dynamic capability, are key sources for firm's sustained competitive advantage and survival in knowledge-based and high-tech industries. Under this rationale has emerged a research stream where knowledge management, organizational learning, or intellectual capital, help to understand and constitute the key pieces of one of the most complex business phenomena; the 'firm's technological advantage'. This being so, it is also true that in knowledge-based and high-tech industrial markets, competitive success comes directly from continuous technological innovations, where a single organization cannot successfully innovate in isolation; therefore, firms should rely on external relationships and networks in order to complement its knowledge domains, and then, develop better and faster innovations. In this sense, I would like to highlight the cross-fertilizing role of three constructs that are nurtured by different research traditions: 'collaborative/open innovation', from Strategy and Innovation Management research; 'absorptive capacity', from 'A Knowledge-Based View'; and 'market orientation', from Marketing research.

1. Introduction

The Knowledge Economy and Society (Dean & Kretschmer, 2007; Grant, 1996) is characterized by economic globalization, the emergence technological advances in several industrial and scientific domains and the progressive primacy of knowledge-intensive and technology-based industrial markets (Lancioni & Chandran, 2009). In addition, very short product life cycles, and an accelerated change rate in customer's needs and preferences are mentioned as typical features on current industrial paradigm. In this new competitive arena, knowledge and intellectual assets are emerging as the new key production factors, replacing the traditional – land, labor, and capital – in explaining firm's survival and competitive advantage (Martín-de Castro, Delgado-Verde, Navas-López, & López Sáez, 2011).

In this new competitive landscape, one of the best ways for reaching firm sustained competitive advantage position comes directly from continuous innovations, relying on different organizational, technological, and marketing dynamic capabilities to effectively deliver a constant flow innovative products and services to consumers (Teece, Pisano, & Shuen, 1997). In this sense, a recent theoretical proposal by Barrales-Molina, Martínez-López, and Gazquez-Abad (2014) shows the role of dynamic marketing capabilities integrating the concepts of absorptive capacity and knowledge management. Both, open innovation and absorptive capacity, have important complementarities that need much more attention by industrial marketing, innovation management, and strategy scholars (Spithoven, Clarysee, & Knockaert, 2011). As Wallman (2014) highlights, the increasing complexity of business, especially in B2B markets, makes more relevant for marketing academics to create new ways of thinking about marketing capabilities and strategy.

From the management literature, different current theoretical developments as the 'Knowledge-Based View' or the 'Intellectual Capital-Based View' (Reed, Lubatkin, & Srinivasan, 2006) state that firms' innovative capabilities depend very closely on the intellectual assets and knowledge that they possess (Subramaniam & Youndt, 2005), as well as on their ability to deploy them, understanding the innovation process as one of the most knowledge-intensive complex business process (Grant, 1996; Nonaka & Takeuchi, 1995). However, despite the very intuitive character of this intellectual assets-innovation capabilities link, additional research efforts aimed to explore this phenomenon are needed.

Firms operating in high-tech and knowledge-based industrial markets should rely also on external relationships and networks in order to complement their knowledge domains and develop innovations in a better, faster and effective way. In this sense, as Athaide and Zang (2011) or Huggins (2010) remark, the seller–buyer and inter-organizational network interactions are essential in new product development in technology-based industrial markets. This reasoning points directly to a new innovation management paradigm, labeled as 'collaborative innovation' or 'open innovation' (Chesbrough, 2003),

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where firm's knowledge management for innovation, knowledge and intellectual capital exploration, retention, and exploitation, are inside and outside firm's boundaries (Lichtenthaler, 2009). As Amara and Landry (2005) highlight, the introduction of innovations with a high degree of novelty requires a wider range of information and knowledge sources, both inside and outside the organization.

To understand knowledge management and innovation processes in industrial markets, concepts as absorptive capacity, open innovation, market orientation, or relational learning, are key theoretical developments that help to explore the increased complex knowledge management, innovation process, and competitive advantage in knowledge-intensive and technology-based industrial markets (Chen, Lin, & Chang, 2009). Indeed, in the last years, researchers from marketing and strategic management have stressed the increasing role of external source learning to obtain novel ideas and new knowledge for the innovation process (Jiménez-Jiménez & Cegarra-Navarro, 2007).

In this sense, several research streams and key constructs appear as the outcome of the cross-fertilization among the industrial marketing, innovation management, and strategy research agenda.

- Open innovation.
  Open innovation, that implies the purposive use of knowledge inflows and outflows to accelerate firm innovation and expand the markets for external use of innovation (Chesbrough, 2003), works under the assumption that in high-tech and knowledge-based industrial markets, a single organization cannot successfully innovate in isolation. Open innovation, that has been replacing the traditional closed model of innovation, has two main dimensions (i) inbound or outside-in open innovation, that entails the opening up to, and establishment of relationships with external agents with the aim to access their competences and knowledge and thus improve *firm's own* innovation performance; and (ii) outbound or inside-out open innovation, by establishing relationships with external agents in order to commercially exploit innovation opportunities. (Chesbrough, Vanhaverbeke, & West, 2006).
  Open innovation is one of the main hot topics in the academic debate for management scholars in recent years, and there are still many unanswered questions that require further investigations (Chiaroni, Chiesa, & Frattini, 2011), representing a new paradigm for industrial innovation management. In this sense, the degree of openness of a firm can be explored by two main dimensions: (i) external search knowledge breadth, defined by the number of external sources of knowledge used by the firm; and (ii) external search depth, defined as the extent to which firms draw deeply from the different external sources (Laursen & Salter, 2006).
  There is an increasing consensus that firms' external network embeddedness improves firm's innovation performance (De Jong & Freel, 2010).
- Absorptive capacity.
  Jointly with a certain degree of openness, firms simultaneously need to integrate internal and external information and knowledge from employees, customers, competitors, media, etc., to enhance their organizational knowledge base and innovation performance (Lin, Che, & Ting, 2012). Yet several firms exposed to the same amount of external knowledge flows might not derive equal benefits to all of them (Escribano, Fosfuri, & Tribó, 2009), since every single organization needs to assimilate and integrate these flows into their unique organizational knowledge and innovation processes. Thus, additional dynamic capabilities should be developed by the organizations. In this sense, absorptive capacity appears as a promising dynamic capability that improves and complements an open innovation strategy. Absorptive capacity can be understood as the firm's ability to acquire, assimilate, and apply knowledge to commercial ends (Cohen and Levinthal, 1990; Zhara & George, 2002). There is a certain consensus in the academia in considering the following dimensions of absorptive capacity (Zhara & George, 2002): i), identification and acquisition of external knowledge; ii) assimilation, in order to analyze, process, interpret and understand external information and knowledge; iii) transformation, to combine the existing organizational knowledge base and the newly acquired external knowledge; and finally iv) exploitation, which requires the effective application of new knowledge and learning for organizational and innovation purposes.
- Market orientation, relational learning, and product innovation performance.
  From a marketing literature perspective, firm's openness and absorptive capacity can be connected to the parallel phenomena of market orientation, being important for managers to understand these links (Lin et al., 2012). Market orientation enables firms to better understand customer's preferences and competitor's strategic movements, acting as marketing intelligence. Customer knowledge management offers a useful tool to offer products and services that meet customers' expectations. A significant portion of the innovations within an industry is initiated by lead users. It is widely accepted among marketing and innovation management scholars that customer orientation is rewarded by higher innovation performance (Luthje, 2004). Thus, further research lines linking organizational capabilities as organizational learning and market orientation as drivers of organizational success are needed (Jiménez-Jiménez & Cegarra-Navarro, 2007).
  The orchestration of networks between suppliers and customers increases the utilization of co-created knowledge and co-learning in developing knowledge-intense integrated solutions that depend on the firm's absorptive capacity (Hakanen, 2014). Firms that seek to gain sustained competitive advantage through knowledge utilization depend on their absorptive capacity.
  Close interactions between the firm and its customers and lead users during the new product developments increase the chance of product innovation successfully (Athaide and Zang, 2011), by understanding buyer's needs and preferences. An earlier and deeper supplier involvement emerges as one of the most effective ways to improve new product development (Clark, 1989). Hughes, Morgan, Ireland, and Hughes (2014) propose that learning obtained thorough relational social capital improves firm performance when this relationship is mediated by absorptive capacity, showing the inherent complex interrelationships of these constructs for the innovation management agenda.

2. Research topics and contributions

The meta-analysis developed by Saeed, Yousafzai, Paladino, and de Luca sheds some light on the inside-out vs. outside-in orientations and innovation performance, trying to add value to the current academic debate about the relative value of internal and external sources of firm innovation performance, or innovation strategic orientation, and hence, initiating the debate about closed vs. open or collaborative innovation paradigms. The first approach – inside-out orientation – focuses on the role played by organizational internal resources and capabilities on innovation performance, grouping these internal elements into organizational mission and innovation strategy; resource allocation; structure and systems; knowledge management systems; and organizational culture. Management theories as Resource-based View, Dynamic Capability-Based View or Evolutionary Economics are useful to frame their origins, nature and roles.

The second one – outside-in orientation – centers on resources and capabilities that reside outside the firm — from customers, suppliers, competitors, etc. Marketing literature emphasizes the importance of market focus and a relational view of the firm in improving innovation and economic performance. Under this approach, a firm beneficiates

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