International Business Review 23 (2014) 542–551

Contents lists available at ScienceDirect

International Business Review

journal homepage: www.elsevier.com/locate/ibusrev

Local and international knowledge search and product innovation: The moderating role of technology boundary spanning

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ARTICLE INFO

Article history:
Received 23 March 2013
Received in revised form 5 September 2013
Accepted 13 September 2013
Available online 23 October 2013

Keywords:
Knowledge search
Local search
International search
Technology
Product innovation
Emerging markets
China

ABSTRACT

Drawing on the external knowledge search literature and the literature on international diversification, this study examined the interactive effect of local and international search for new knowledge on product innovation and the moderating role of a firm's technology boundary spanning activities. Specifically, it proposed that extensive local and international search interact to positively predict product innovation success and this relationship is weaker for firms entering a new technology domain. The results using data on 343 Chinese manufacturing firms across 5 industries indicated the support for the predictions.

1. Introduction

Product innovation is fraught with uncertainty given firms' foggy market information and rapid technological developments that can quickly devalue a firm's existing knowledge base (Eisenhardt & Tabrizi, 1995). Academic studies have found that external knowledge, knowledge that spans a firm's boundaries, is vital for success in innovation (Phene, Fladmoe-Lindquist, & Marsh, 2006; Rosenkopf & Nerkar, 2001). A central idea of those studies is that open search for new knowledge helps a firm access external sources of knowledge, overcome the risk of blind spots and avoid unexpected changes in the market and technology (Chesbrough, 2003; Rosenkopf & Nerkar, 1999). Research results have emphasized that the scope of external search – covering a wide range of external actors and sources – is very important (Laursen & Salter, 2006; Leiponen & Helfat, 2010). In spite of the large body of evidence documenting the influence of search scope on innovation outcomes, many previous studies have focused their attention on sources of knowledge for innovation within a firm's national market (e.g., Garriga, von Krogh, & Spaeth, 2013; Laursen & Salter, 2006; Leiponen & Helfat, 2010). Relatively less scholarly research has investigated the importance of sources of external knowledge beyond national boundaries.

At the same time, research on international diversification has shown that firms expanding to multiple foreign countries with diverse market environments can enhance their competence and capabilities, resulting in better firm performance than competitors expanding into only a few or similar market environments (Barkema & Vermeulen, 1998; Hitt, Hoskisson, & Kim, 1997; Zahra, Ireland, & Hitt, 2000). Yet, despite the extensive literature in this area, little research has directly investigated how knowledge search in foreign markets interacts with domestic search activities. This lacuna is surprising because they represent two dimensions of the same external search process. The extent to which the knowledge-generating potential of a firm's external knowledge search is fully realized will depend on its search both at home and overseas. Simultaneous examination of two sources of knowledge is necessary to properly analyze the effectiveness of a firm's external search activities in promoting innovation.

The present analysis addressed these weaknesses by examining local and international search together in terms of their relationship with success in product innovation. The premise of this study was that knowledge search in both international and domestic markets must be accounted for when explaining innovation success, as the two sources complement each other in predicting better product innovation success. Further, the complementary effect varies depending on a firm's technology domain spanning,

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http://dx.doi.org/10.1016/j.ibusrev.2013.09.002

that is, a firm's adopting new technology that is outside its existing technological domain.

By integrating the external knowledge search literature and the literature on international diversification, this study strived to contribute to both research traditions. This study extended prior work on external knowledge search by recognizing international markets as an important source of knowledge complements a firm's local searching. This study also contributed to the research on international diversification by examining the interactive effect of international search and local search. The results demonstrated that local search and international search augment each other in promoting successful product innovation. This study also advanced prior research by highlighting the boundary condition of the joint effect of local and international search on product innovation.

This study tested the hypotheses using data on 343 Chinese manufacturing firms in multiple industries over a period of three years (1998–2000). China's increasing market liberalization generates a highly complex and dynamic market environment. New products are being introduced at an unprecedented pace (Zhang & Li, 2010; Wu, 2012). To survive and succeed in this rapidly changing market, Chinese firms are under great pressure to search out and acquire advanced technologies through intensive search for new ideas and products (Child & Rodrigues, 2005). Moreover, many Chinese firms have rapidly expanded to foreign markets. While some concentrate on a few foreign markets, others expand to a large number of diverse destinations. One of the primary motivations for Chinese firms to expand globally is to acquire advanced technology and management skills (Beebe, Hew, Yueqi, & Dailun, 2006). Intensive local search, strong motivation to acquire world-class technologies, aggressive international expansion and rapid product innovation all make Chinese firms particularly useful for studying the relationship between local and international search and product innovation.

2. Theory and hypotheses

2.1. Local and international knowledge search

In recent decades, rapid product development has become a pivotal strategic competence for many organizations as they adapt and transform themselves in changing business environments (Ahuja & Lampert, 2001; Brown & Eisenhardt, 1995; Katila & Ahuja, 2002). There is plenty of evidence supporting the importance of rapid product development for firm growth and success (Clark & Fujimoto, 1991; Eisenhardt & Tabrizi, 1995; Roberts, 1999; Stalk & Hout, 1990). With the constant pressure for fast adaption, the innovation literature has increasingly emphasized that knowledge search beyond organizational boundaries is a primary way in which fast product development can be promoted (Cassiman & Veugelers, 2006; Chesbrough, 2003; Laursen & Salter, 2006). For many organizations, the ideas, knowledge and expertise available internally are inadequate, so getting access to external knowledge and resources becomes critical for their success in quickly creating new products (Rosenkopf & Nerkar, 2001). Not surprisingly then, the role of external knowledge search in product innovation has evoked academic research interest. Previous studies have suggested that firms should draw upon a greater number of external sources in their innovative activities to build a broader knowledge base and reduce the risk of blind spots and unexpected technological discontinuity (Garriga et al., 2013; Grimpe & Kaiser, 2010; Laursen & Salter, 2006; Leiponen & Helfat, 2010).

Scholars have identified two main external search strategies: local search and boundary-spanning search (Rosenkopf & Nerkar, 2001). Local search involves searching for solutions in a firm's current geographic and technological vicinity (March & Simon, 1958; Nelson & Winter, 1982). Such local search helps firms create incremental innovations quickly and at low cost, and helps them become more expert in what they are already doing, but it can also lead them to develop core rigidities or into competence traps (Leonard-Barton, 1998; Levitt & March, 1988). Boundary-spanning search involves searching for solutions beyond the neighbourhood, which is riskier, but allows firms to access more technological opportunities and acquire new technologies that are not available through local search (Rosenkopf & Nerkar, 1999). As in prior studies (e.g., Kogut & Zander, 1992; Nelson & Winter, 1982; Phene et al., 2006), local search in this study refers to searching for new knowledge within a firm's national boundaries, while international searching internationally for new knowledge.

Local knowledge tends to be easier to apply, as the presence of a common national context implies shared national values about issues such as independence, risk sharing and individual success (Phene et al., 2006; Rosenkopf & Nerkar, 2001). Knowledge gained locally enables a firm to quickly build expertise and is more likely to lead to competitive advantage in the local market. However, a study by Stuart and Podolny (1996) has demonstrated that few firms are able to successfully reposition themselves by moving away from local search and even fewer are able to create new knowledge through recombining knowledge from across national boundaries.

International diversity exposes a firm to a richer array of environments with more varied demand characteristics and a large variety of rivals, suppliers, and partners working from different technology bases (Barkema & Vermeulen, 1998; Miller & Chen, 1994; Zahra et al., 2000). Compared with firms that focus on a single market, firms searching internationally and targeting multiple markets can expect to confront a wider range of challenges from more numerous competitors and more diverse customer needs (Abrahamson & Fombrun, 1994; Casillas & Moreno-Menéndez, 2013). Such challenges tend to trigger the development of strong technological capabilities and new competencies (Barkema & Vermeulen, 1998; De Clercq, Sapienza, Yavuz, & Zhou, 2012). Differences in perspectives and thinking often mean that counterparts in different national contexts apply the same knowledge in different ways (Phene et al., 2006). A broad array of customer needs provides managers with experience in dealing with different market demands, and the resulting diversity in their knowledge contributes to a richer knowledge structure for the entire organization (Walsh, 1995). Extensive academic work in this area has shown that multinational diversity promotes organizational learning and facilitates the development of skills and competencies that help a firm achieve competitive advantage (e.g., Barkema & Vermeulen, 1998; De Clercq et al., 2012; Zahra et al., 2000).

Firms undertaking over-broad searching, however, risk losing focus and hurting their core competencies (Koput, 1997; Laursen & Salter, 2006). This is especially pertinent for firms searching in international markets. Although the diverse knowledge to be found in very different national contexts creates a potential for picking up non-overlapping knowledge components, not all knowledge identified in external searching activities – and particularly through international search – can be incorporated into a firm's activities. Some of it is simply too distant from the firm's existing competence. The ability to effectively assess such new technology and assimilate it into new product development is further limited by difficulties in understanding foreign practices, national systems of innovation, strange institutional environments, unrelated cultural backgrounds, and so on (Phene et al., 2006). Moreover, the positive impact of broad search can be outweighed by the costs and constraints involved in dealing with a large amount of information (Grimpe & Kaiser, 2010; Katila & Ahuja, 2002). As a firm tries to manage and integrate disparate bits