



Effects of external and internal sources on innovation performance in Chinese high-tech SMEs: A resource-based perspective

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ARTICLE INFO

Article history:

Received 28 July 2014

Received in revised form 25 March 2016

Accepted 12 April 2016

Available online 25 April 2016

Keywords:

Customer input

Network

R&D intensity

Innovation performance

Chinese high-tech SMEs

ABSTRACT

Drawing on the resource-based perspective, we empirically investigate the effects of external and internal sources on innovation performance by focusing on customer input, cooperative networks, and R&D intensity using a sample of Chinese high-tech small and medium-sized enterprises (SMEs). We find that customer input and cooperative networks have the positive impacts on the innovation performance of high-tech SMEs. R&D intensity positively moderates the relationship between customer input, network size, and innovation performance in high-tech SMEs, and does not serve as a moderator in the relationship between network duration and innovation performance in high-tech SMEs.

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1. Introduction

In the “open innovation” era, innovation can be generated from a variety of sources. Firms may source innovation either internally from R&D activities and employee creativity, or externally from customer involvement and collaboration with strategic partners (Tsai et al., 2011). Research has shown that small and medium-sized enterprises (SMEs) tend to seek external sources and assistance due to their resource constraints (O’Regan and Kling, 2011; Zeng et al., 2010). Building innovation capabilities for SMEs has become increasingly critical to business mode transformation, particularly for high-tech firms. SMEs in this sector must be more creative and innovative in order to survive, compete, and grow because technologically-driven firms operate in a vibrant internal and external competitive environment characterized by rapid technological change, and shortened product life cycles (Gumusluoglu and Ilsev, 2009).

SMEs in China have witnessed a rapid expansion in numbers and scale since the economic reforms of the late 1970s, and have played a significant role in accelerating economic growth in the last three decades (Chen, 2006). With the development of a market-oriented economy in China and the acceleration of globalization processes, however, it is imperative that SMEs transform that extensive growth mode into an intensive one, as the extensive mode can no longer meet the requirements of global competition (Chen, 2006). Recently, high-tech SMEs have been encouraged by the Chinese government at all levels

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through favorable technology and innovation policy (Wang et al., 2013). Therefore, understanding which sources can be used for enhancing innovation performance has become increasingly important for Chinese high-tech SMEs.

Drawing on the resource-based view, innovation is the result of unique resources and the accumulation of knowledge (Leitner, 2011). Successful innovation rests on external knowledge integration capabilities and technological capabilities (Verona, 1999). Empirical evidence regarding the role of the different forms of internal and external knowledge and their links to innovation is still limited, particularly for SMEs (Leitner, 2011). First, recent research has been focused on identifying the roles of external sources in SME innovation, such as Research and Development (R&D) outsourcing (O'Regan and Kling, 2011), cooperative networks (Bougrain and Haudeville, 2002; Zeng et al., 2010), and customer involvement (Kuusisto and Rieppula, 2011). Developing relationships with customers allows SMEs to maximize the utilization of their limited resources (Appiah-Adu and Singh, 1998). However, few studies explore the specific role of customer input in the innovation performance of high-tech SMEs. Based on the resource-based view, we posit that customer input is one of the key factors that will allow high-tech SMEs to achieve greater innovation performance.

Second, firms are increasingly looking for external resources as they seek to develop innovation capability for business success (O'Regan and Kling, 2011). From the social capital perspective, networks have become valuable in transmitting resources for firm growth (Bratkovic et al., 2009; Kajikawa et al., 2010) and innovation (Ahuja, 2000; Gu et al., 2013). The resource-based perspective considers the creation and maintenance of networks as a mechanism in accessing scarce resources. The role of external networks may benefit resource-poor SMEs, enabling them to create competitive advantages (Gronum et al., 2012; Thorgren et al., 2009). Networks with external partners are extremely important for innovation as they help firms to combine new forms of knowledge and enhance information exchange with external actors (Leitner, 2011).

While research has examined the roles of different types of cooperative networks such as cooperation with customers and suppliers in general innovation performance (Zeng et al., 2010), there is a dearth of research examining the effects of the differing characteristics of cooperative networks, such as network size and duration, on the innovation performance of high-tech SMEs. In our study, drawing on the resource-based perspective, we seek to contribute to the research on the role of cooperative networks in innovation by focusing on the effects of two dimensions of the cooperative network, network size and duration, on innovation performance in high-tech SMEs.

Third, the resource-based view states that firm success is not only determined by external factors but also by internal characteristics (Prahalad and Hamel, 1990; Padgett and Galan, 2010). Thus, external and internal sources may have interacting effects on the innovation performance of high-tech SMEs. Research on SME innovation sources has been primarily focused on testing the effect of a particular source, either internal or external (Bougrain and Haudeville, 2002; Kuusisto and Rieppula, 2011; O'Regan and Kling, 2011). To our knowledge, few studies have examined the interaction effects of external and internal sources on the innovation performance of high-tech SMEs. Investments in R&D are crucial characteristics for innovation performance (Leitner, 2011). Additionally, some studies have suggested that R&D expenditure should be included as a moderator in theoretical models that have received mixed or ambiguous empirical support (Padgett and Galan, 2010). Although the effect of R&D spending on firm performance has received much research attention (Le et al., 2006; Lin et al., 2006; Morbey, 1988), the roles of complementarity and interaction between customer input, network, and R&D intensity have been largely ignored in empirical studies. This study addresses that research gap.

In the current study, we empirically investigate the main effects of external sources (i.e., customer input and cooperative network) on innovation performance in high-tech SMEs as well as the moderating role of R&D intensity, guided by the resource-based view. We tested all hypotheses using the database of Chinese high-tech SMEs from a Chinese government financial program. We first present the theoretical framework and hypotheses. We then describe the methodology of the study and report the empirical results. We conclude by discussing the implications for research and practice and identifying the limitations and directions for future research.

2. Theoretical framework and hypotheses

2.1. Resource-based approach

This study is informed by the resource-based view (RBV) (Barney, 1991). RBV posits that a firm possesses a valuable bundle of resources and capabilities (Wernerfelt, 1984), and some resources and capabilities can have superior effects on firm performance (Nath et al., 2010). Capabilities are represented by bundles of skills, abilities, and accumulated knowledge that enable the firm to achieve desired outcomes (Day, 1990; Nath et al., 2010), while information and knowledge are increasingly considered to be valuable resources and dynamic capabilities (Chen et al., 2011). The firm's survival and sustainable development depend on its resources and capabilities to create competitive advantages (Peteraf, 1993; Sirmon et al., 2011). Thus, RBV considers that firms must not only put their resources and capabilities to best use, but also develop their new resources and capabilities in order to maintain and develop more competitive advantages (Nath et al., 2010; Peteraf, 1993). We adopt the source-resource and capability-performance framework to analyze the effect of external and internal sources and their resulting resources and capabilities on high-tech SME innovation performance by focusing on customer input in providing information on customer needs and experiences, and cooperative networks in transmitting resources and capabilities, and R&D intensity in cultivating R&D capability and absorptive capability.

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