



Open innovation in SMEs—An intermediated network model

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ARTICLE INFO

Article history:

Received 7 August 2008

Received in revised form

29 November 2009

Accepted 14 December 2009

Available online 12 January 2010

Keywords:

Open innovation

SME

Network

Intermediary

Case study

ABSTRACT

In spite of increasing interest in open innovation, discussion about the concept and its potential application to the SME sector has been excluded from mainstream literature. However, given that the argument about the effect of firm size on the effectiveness of innovation is still ongoing, it is worth addressing the issue from an SME perspective. That is the focus of this article, which seeks, firstly, to place the concept of open innovation in the context of SMEs; secondly to suggest the input of an intermediary in facilitating innovation; and finally to report accounts of Korean SMEs' success in working with an intermediary. The research results support the potential of open innovation for SMEs, and indicate networking as one effective way to facilitate open innovation among SMEs.

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1. Introduction

Innovation is traditionally viewed as taking place mostly within a single firm. But the increasing availability and mobility of knowledge workers, the flourishing of the internet and venture capital markets, and the broadening scope of possible external suppliers in the present age have undermined the effectiveness of the traditional innovation system (Chesbrough, 2003). In the wake of these changes, the concept of open innovation has emerged, with processes that are characterised as spanning firm boundaries. Companies now want to include in their business model not only the commercialisation of their own ideas, but also of external ideas. The analysis of open innovation has subsequently been extended to various perspectives, e.g. studies on the industrial dynamics of open innovation (Christensen et al., 2005), on the open innovation processes in a particular industry sector (Cooke, 2005; Henkel, 2006), or on ways in which to boost open innovation (Lichtenthaler, 2008).

In spite of the increasing interest in open innovation research, most previous studies have been intended for managers in large technology-based companies, where the notion of open innovation first started. Discussions about the concept of open innovation in small and medium-sized enterprises (SMEs) have been excluded

from the mainstream (West et al., 2006) for the following reasons. Firstly, open innovation is more easily studied in larger firms, as SMEs have less ability to access external resources and fewer technological assets that they can exchange than larger firms (Narula, 2004). However, considerations about open innovation also need differentiating between SMEs and large firms, since it is generally recognised that they are good at different types of innovation (Vossen, 1998). Secondly, SMEs use non-internal means of innovation more than large firms, as they consider alliances or network as ways to extend their technological competences (Edwards et al., 2005; Rothwell, 1991), which means that innovation in SMEs is already has an external focus, and the concept is not new to them. However, their collaborations tend to be limited to strategic alliances with larger firms (Rothwell and Dodgson, 1994) and outsourcing, mainly via other SMEs (Rothwell, 1991). Considering the fact that firms involved in multiple types of ties are more innovative than those which only utilise one type of tie (Baum et al., 2000; Powell and Owen-Smith, 1999), it is important to investigate the potential of different types of SME ties in the context of open innovation. Finally, SMEs consider external sources as a means of getting access to marketing and sales channels at the later stages of innovation (especially the commercialisation stage), while open innovation normally focuses more on the early stages of innovation, addressing external technology sourcing and networking with technology providers and innovative, upstream companies (Vanhaverbeke and Clodt, 2006). Though open innovation at the commercialisation stage has not been considered seriously in the

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existing literature, it can be an important topic, since economic values of innovation at the commercialisation stage are to a large extent towards other downstream players.

While the argument on the effect of firm size on the effectiveness of innovation is still ongoing, it is worth addressing the particularities of open innovation from the perspective of SMEs which are nevertheless major actors in innovation (Maula et al., 2006). This article therefore focuses on open innovation strategies in SMEs, firstly seeking to place the concept of open innovation in the context of SME, and secondly to encourage innovation by suggesting a network model that emphasises the role of intermediaries in linking SMEs. Finally, it introduces some stories of open innovation success in Korean SMEs that have flowed from the intermediary activities of the Korean Integrated Contract Manufacturing Service (KICMS), which was established to facilitate innovation in Korean SMEs. The research results support the notion of open innovation in SMEs, by proposing intermediation as one way of facilitating this strategy, and by suggesting an intermediated network as an effective model to enable their collaboration and specialisation.

The rest of this paper consists of four parts. The following section briefly reviews the characteristics of innovation in SMEs, while Section 3 discusses how those characteristics can be reflected and facilitated by proposing an open innovation model for SMEs. To verify this discussion, open innovation efforts among Korean SMEs are introduced in Section 4. For this purpose, we analysed the report, Korea's Technology Innovation completed in 2005 and published by the Survey Science and Technology Policy Institute (STEPI) to understand the nature of innovation activities in Korean SMEs, and conducted a case study of KICMS activities. The final section presents some conclusions and notes on limitations.

2. Open innovation in SMEs

2.1. Nature of innovation in SMEs

There is considerable literature about innovation, and various models have been suggested to describe its nature, such as product innovation and process innovation; radical innovation and incremental innovation; systemic innovation and component innovation; technology-push and market-pull; and more recently closed innovation and open innovation. Models can also be divided according to their innovation processes (linear models, chain-linked models, etc.), or according to the fitness for developed or developing countries, etc.

However, strangely, there have been very few studies regarding an innovation model specialised for SMEs. The majority of literature limits its focus to the study of entrepreneurial traits or structural characteristics (Hoffman et al., 1998), but there is little examination of the embeddedness of innovation in SMEs (Shaw, 1998; Paniccia, 1998). According to Laursen and Salter (2004), it is not statistically evident that larger firms are better than SMEs in new-to-the-world-type innovation, meaning that SMEs may well have capacity for innovation, especially radical innovation. It is agreed that, while SMEs' flexibility and specificity can be advantages in accelerating innovation, few of them have sufficient capacity to manage the whole innovation process by themselves, and this encourages them to collaborate with other firms (Edwards et al., 2005). They can lack the resources and capabilities in manufacturing, distribution, marketing and extended R&D funding, which are essential for transforming inventions into products or processes. As a result, while many studies have shown that SMEs tend to have a higher R&D productivity than larger firms (although there is considerable variation by industry, see Audretsch and Vivarelli, 1996), there is still much debate on assessing the innovativeness of SMEs because of their material or resource factor disadvantages.

Apart from this argument, SMEs have an obvious role in innovation: UK figures, for instance, show that (including sole traders) SMEs account for 99% of business, 55% of non-governmental employment and 51% of turnover (SBS, 2001). Naturally, encouraging innovation in SMEs is central to policy initiatives for stimulating economic development at the local, regional, and even national levels (Jones and Tilley, 2003). The question then becomes how to facilitate innovation in SMEs, trying to discover which factors contributed to the success (or failure) of their innovation efforts. Specifically, as technology becomes so complex that it cannot be handled by one firm alone, and relevant knowledge is evermore scattered across various firms, collaboration between firms is increasingly regarded as an important factor for success. SMEs also have engaged in various modes of collaboration (Kleinknecht and Reijnen, 1992), and SME networking and alliances have attracted considerable research attention. Here, common collaboration modes are based on bi-firm networks and include alliances with and outsourcing to other firms. For example, Mangematin et al. (2003) show that biotechnology SMEs typically enter into contracts with big industrial groups or run small projects, manufacturing their own products and marketing them. Networking represents another possible form of collaboration, and its growing use by SMEs reflects a possible catch-up of large firms (Narula, 2004), with many researchers claiming that the success of SMEs in comparison to their larger competitors is based on their ability to utilise external networks more efficiently (Rothwell and Dodgson, 1994). Mytelka (1991) even suggests that a firm's competitiveness is determined more by its external networks than its size. SMEs have been noted to use external resources to (among other things) shorten innovation time, reduce risk and cost and increase the flexibility of their operation (Hagedoorn, 1993), but their use must be carefully considered in strategic terms, as inter-firm collaboration can also lead to new risks and threats as well as transaction cost. Nevertheless, inter-firm collaboration is particularly important for SMEs with limited complementary assets who need to leverage their technology externally (Lichtenthaler, 2005).

We argue that a necessary focus for future research is the nature of innovation in SMEs, and the extent to which open innovation is embedded in such firms. Open innovation in SMEs will be different from that in larger firms, since innovation processes differ between the two (Vossen, 1998). But innovation processes have not been explicitly analysed within the context of open innovation (West et al., 2006), despite the fact that moving from a relatively closed world to a very open one has posed important challenges for SME (Maranto-Vargas and Gómez-Tagle Rangel, 2007).

2.2. Concept of open innovation in SMEs

Open innovation is an emerging paradigm based on the following assumption:

Valuable ideas can come from inside or out of the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market during the Closed Innovation era (Chesbrough, 2003).

As the prevailing literature indicates, the possibilities for open innovation in SMEs also lie with external sources, which are often critical to the innovation process in any type of organisation (Cohen and Levinthal, 1990). Where large firms focus mainly on R&D in open innovation efforts, SMEs focus more on commercialisation because, while many of them have superiorities in technology for invention, they often lack the capacity in terms of manufacturing facilities, marketing channels and global contacts to introduce them effectively to the innovation market (Narula, 2004). Consid-

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