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Regional innovation system, absorptive capacity and innovation performance: An empirical study

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ABSTRACT

Recent studies have separately investigated the importance of regional innovation systems (RISs) and absorptive capacity (AC) to innovation performance. This study explores their interdependency on the premise that better utilization of RIS enhances innovation performance because the RIS enhances the absorptive capacity of the firm. In this study, we cover three typical elements of RIS: regional innovation initiatives (RII), knowledge-intensive business services (KIBSs) and value chain information sources. This study explores the relationships of these elements on the acquisition, assimilation, transformation and exploitation learning processes of absorptive capacity. Data were obtained through a mailed survey using a self-administered questionnaire. The results show that RII, KIBS and value chain information sources affect a firm's absorptive capacity, leading to better innovation performance. Specifically, KIBS improves the acquisition process, value chain information sources improve the acquisition and assimilation processes, and RII improve the transformation process. This study contributes to the literature by exploring how a firm interacts with RIS by utilizing various RIS initiatives to enhance the firm's absorptive capacity and innovation performance. It also increases our understanding of how AC learning processes relate to RIS and innovation performance.

1. Introduction

Knowledge is the center of the creation and maintenance of innovation, which plays a critical role in predicting the long-term survival of firms and in sustaining a region's economic development (OECD, 2010; Porter, 1990). Knowledge and technology are the key drivers of competitive advantage at national, regional and firm levels (Grant, 1996). To create such knowledge, regional innovation system (RIS) literature suggests that regional actors in science and technology and regional innovation policies play critical roles in creating appropriate contexts for knowledge creation and transfer (Huggins and Kitagawa, 2011; Delgado et al., 2010; Cooke et al., 2004; OECD, 2007). Regional institutions can formulate innovation policy, create opportunities for innovation, conduct basic and applied research, promote human resource development, help technology diffusion and encourage technology entrepreneurship (OECD, 2010; OECD, 1997). RIS studies tend to focus on the importance of external factors on a firm's innovation performance without considering the firm's internal capabilities (Yam et al., 2011; Romijn and Albaladejo, 2002). While some studies suggest a combination of external and internal factors in studying innovation (Caloghirou et al., 2004; Galende and Fuente, 2003), the problem of studying innovation and business effectiveness at the regional level has not yet been completely resolved (Delgado et al., 2010; Acs et al., 2002). No active discussion has yet taken place on how a firm interacts with the region to enhance its capacity to innovate and achieve global competitiveness (Yam et al., 2011; Romijn and Albaladejo, 2002).

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On the other hand, organization learning literature argues that when external knowledge is easy to access, leveraging companies may be difficult (Escribano et al., 2009) because of insufficient prior knowledge (Cohen and Levinthal, 1990). To overcome such difficulties, companies need to develop absorptive capacity (AC), which refers to a firm's ability to utilize external knowledge through the sequential learning processes of acquisition, assimilation, transformation and exploitation (Lewin et al., 2011; Zahra and George, 2002). Walter Rostow first proposed the concept of absorptive capacity, stating that the takeoff of economic growth in a country requires the society and its productive enterprises to change politically, socially and institutionally, thus increasing the rate of absorption of innovation (Rostow, 1956; Rostow, 1980). A firm with an effective AC has a high level of prior related knowledge that helps it recognize the value of new information and assimilate and apply it to create business value (Cohen and Levinthal, 1990). Recent studies have explored the role of AC on the relationship between external factors to a firm's innovation performance (Kostopoulos et al., 2011; Li, 2011). However, these studies have inadequately considered multidimensional views of AC (Jansen et al., 2005). A majority of the studies use proxies such as R&D expenditures, number of scientists, the existence of training for R&D staff, or a combination rather than direct measures (Volberda et al., 2010). AC is more than R&D and requires different knowledge contents (Lane et al., 2006). It is unclear whether the different dimensions of AC can be enhanced by different RIS elements.

The present study contributes to existing knowledge in two ways. First, recent literature calls for more studies on understanding the multidimensional views, direct measures and antecedents of AC (Cohen and Levinthal, 1990; Lewin et al., 2011; Volberda et al., 2010; Lane et al., 2006). This study contributes to the literature by breaking AC down into four separate learning processes and testing their relationships with antecedents of AC (i.e., RII, value chain information sources and KIBS) as well as the tangible outcome of AC (i.e., innovation performance). The investigation of the roles of RIS on a firm's AC would be imperative to understanding the dynamism of external factors on the firm's AC (Zahra and George, 2002; Sun and Anderson, 2010; Todorova and Durisin, 2007). While a few studies have been conducted on the role of AC on external sourcing and innovation performance, the development of AC has hardly been addressed (Filippine et al., 2010).

Second, this study explores the linkages between RIS elements and AC at the firm level. Some literature has studied absorptive capacity at the regional level (Kallio et al., 2010; Azagra-Caro et al., 2006), but not the linkage between RIS and AC at firm level. Firms are the main actors in creating innovation performance in a region, and their capacity to innovate is partly determined by their own capacities and partly by their AC to interact with various regional sectors (Fischer, 2001). Enhancing collaboration and networking within the firm's region is important to economic development and sustainable competitive advantages (Cooke et al., 2004; Kajikawa et al., 2012). However, it is unclear how different types of external interactions at the regional level affect the firm's internal capability development (Romijn and Albaladejo, 2002). This study tries to open the black box of a firm's internal learning processes and identify how RIS inputs relate to firm innovation outputs through different internal learning processes.

2. Theoretical background and hypotheses

According to the literature on innovation systems, absorptive capacity and organizational learning, this study suggests that three elements of RIS – regional innovation initiatives (RII), knowledge-intensive business services (KIBSs) and value chain information sources – affect a firm's absorptive capacity (AC) and that AC affects a firm's innovation performance (Fig. 1).

Regional innovation system (RIS) is a set of networks between public and private agents that interact and give mutual feedback in a specific territory by taking advantage of their own infrastructure to adapt, generate and extend knowledge and innovation (Yam et al., 2011; Cooke et al., 1997; Braczyk et al., 1998). Companies within a RIS benefit from collocation of complementary firms and related institutions in various ways, such as reduced transportation costs, labor specialization and access to supplier, knowledge and venture capitalists (Cooke et al., 2004). Researchers usually examine how companies innovate and conduct business activities in the context of external institutions, government policies, competitors, suppliers, customers, value systems and social and cultural issues (Cooke et al., 2004; Kodama, 2008; Carlsson et al., 2002; Doloreux, 2002). To improve innovation performance, firms need to have the internal capability to learn and improve, which can be complemented by the intensity and proximity of networking as well as the receipt of institutional supports (Romijn and Albaladejo, 2002; Galende and Fuente, 2003). Recent RIS literature tends to examine AC from a collective view of physical, social, human and financial capital within a region (Asheim and Vang, 2006). However, only a handful of empirical studies have examined how different RIS elements affect a firm's AC.

The AC literature suggests that the external environment affects the firm's incentive to develop AC. Cohen and Levinthal (1990) suggest that such incentives include external funding to support R&D activities, extensive knowledge spillovers, low learning costs and a large amount of available external technological knowledge. Zahra and George (2002) propose that the diversity of external knowledge affects the acquisition and assimilation capacity of a firm, while the similarity of external knowledge to internal knowledge improves the transformation and exploitation capacities of a firm. Firms that can utilize research partnerships and organizational policies can increase their AC (Lane et al., 2006). The external environment influences the rate and direction of technological development as well as the development of AC capabilities (Lewin et al., 2011). The number of people being educated by government-supported institutes (e.g., the number of university graduates, PhD graduates, and trained engineers) can be important to the firms' AC because the firm depends on its employees to access external knowledge and to be the gatekeepers of knowledge transfers. More interactions with external sources increase the experiential learning amassed by the firm, which improves the breadth and depth of a firm's knowledge bases, positively influencing a firm's propensity to explore, identify and assimilate new external knowledge (Fosfuri and Tribo, 2008). However, the extant literature usually argues that AC is a