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The impact of exogenous and endogenous factors on external knowledge sourcing for innovation: The dual effects of the external environment

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ABSTRACT

In this study we postulate that a firm's external knowledge sourcing decision is determined by factors that are exogenous and endogenous to the firm and that exogenous factors moderate the effect of endogenous factors on a firm's external knowledge sourcing decision. Exogenous factors of the external environment such as market and technology turbulence and competitive intensity are assumed to induce a firm to source knowledge externally for innovation, whereas endogenous factors such as ambiguity avoidance, organizational inertia, and low absorptive capacity may inhibit external knowledge sourcing. In this study, particularly, we examine both the direct effects of exogenous and endogenous factors as well as the moderating effect of the exogenous factors on firm-specific characteristics on a firm's external knowledge sourcing decision. We postulate that on the one hand, environmental factors may prompt firms to source knowledge externally; however, they may also prevent firms from engaging in external knowledge sourcing by moderating specific organizational attributes endogenous to the firm, thus producing a dual effect. We present research findings from a sample of 127 innovative Korean SMEs to support the existence of direct effects of environmental and firm-specific factors as well as the moderating effects of the external environment on firm-specific factors on a firm's external knowledge sourcing decision with customers, suppliers & distributors and other firms. We discuss the findings and provide directions for future research.

1. Introduction

Firms are efficient means by which knowledge is created, transferred and deployed for innovation (Grant, 1996a; Kogut & Zander, 1993). Firms exist to generate and integrate knowledge for use in strategic action, thus the critical input in production and the primary source of value is knowledge (Grant, 1996a,b; Spender, 1996). This perspective has given rise to the Knowledge-Based View (KBV) of the firm. Critical to the KBV is a firm's ability to acquire new knowledge to generate, renew and accumulate its knowledge stock. This is especially critical for firms in highly dynamic industries where new knowledge is constantly emerging and a firm has to maintain a continuous source of new knowledge to gain and sustain competitive advantage. According to knowledge sourcing theorists, firms

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make conscious decisions to create knowledge internally or acquire knowledge from external sources or both (Chen & Lin, 2004). Knowledge sourcing strategies encompass both internal knowledge sources, those generated inside the firm such as through internal R&D, as well as external knowledge sources, those generated from sources outside the firm through acquisition or imitation (Choi & Lee, 2012). Firms differ in how they source for knowledge thus leading to variations in the capabilities generated and firm performance (Katila & Ahuja, 2002). Knowledge sourcing strategies have been shown to contribute to firm performance (Cassiman & Veugelers, 2006; Lin & Wu, 2010; Leiponen & Helfat, 2011). Internal R&D is a recognized source of new knowledge creation and antecedent to the development of innovative capabilities. However, in highly competitive environments, knowledge in an industry becomes widely distributed across firms. As a result, new knowledge often emerges outside the boundary of the firm. It is thus imperative for firms to source for knowledge from external sources.

Extant research has primarily treated external knowledge sourcing as an independent variable and examined its impact on multiple measures of firm success (Bierly & Daly, 2007; Caloghirou, Kastelli, & Tsakanikas, 2004; Chen & Lin, 2004; Gilley, McGee, & Rasheed, 2004; Howells, James, & Malik, 2003; Jones, Lanctot, & Teegen, 2001; Kessler, Bierly, & Gopalakrishnan, 2000; Leiblein, Reuer, & Dalsace, 2002; Steensma & Fairbank, 1999; Tidd & Trewhella, 1997; Veugelers, 1997; Veugelers & Cassiman, 1999). Also, the market orientation literature has shown that exogenous factors can impede the acquisition of external knowledge (Song & Parry, 2009; Subramanian, Kumar, & Strandholm, 2009). In addition, the market learning literature has shown that there are multiple factors endogenous to the firm that act as barriers to market learning and account for high levels of innovation failures (Adams, Day, & Dougherty, 1998). The impacts of exogenous and endogenous factors on external knowledge sourcing have developed largely as independent research streams. To date few attempts have been made to examine whether environmental and firm-specific factors induce and/or inhibit external knowledge sourcing at similar rates across all different external sources for innovation and the moderating effects between inducing and inhibiting factors on the decision to source for knowledge externally for innovation. For example, to what extent do exogenous and endogenous factors interact to influence a firm's knowledge acquisition for innovation?

In this study we draw upon the extant literature in knowledge management, organizational learning, market orientation and innovation management, to fill these gaps in the literature by empirically examining the direct effects of both exogenous and endogenous factors on external knowledge sourcing and contribute to knowledge sourcing theory by examining the moderating effects of external environment factors on firm-specific characteristics to influence a firm's decision to source for knowledge externally for use in innovation. We postulate that environmental factors of uncertainty (market turbulence, technology turbulence and competitive intensity) not only directly induce firms to initiate external knowledge acquisition for innovation but also indirectly inhibit firms from obtaining knowledge externally by interacting with firm-specific factors (ambiguity avoidance, inward-looking inertia (hereinafter inertia) and low absorptive capacity), thus producing a dual effect (Adams et al., 1998; Cohen & Levinthal, 1990; Song & Parry, 2009). Investigating the moderating effect of environmental factors on firm-specific characteristics in external knowledge sourcing is an important contribution to knowledge sourcing theory as it can explain why firms react differently to sourcing knowledge from various external sources for innovation under the same environmental conditions.

2. Literature review and hypothesis development

KBV theorists argue that the heterogeneity of knowledge among firms forms the basis of sustained competitive advantage since the knowledge created, recombined and utilized in productive activities is unique and not readily replicated (Grant, 1996a). Central to this argument is a firm's ability to source for new knowledge. Knowledge sourcing theorists have maintained that firms make conscious decisions in their strategy for sources of knowledge (Chen & Lin, 2004). Knowledge sourcing strategies encompass both internal knowledge sources, those generated inside the firm such as through internal R&D, as well as external knowledge sources, those generated from sources outside the firm through acquisition or imitation (Choi & Lee, 2012). Knowledge sourcing strategies have been shown to contribute to firm performance (Lin & Wu, 2010). According to Grant (1996a), the lack of perfect correspondence between a firm's knowledge and product and service spheres produces opportunities for what he termed *knowledge trading* to achieve greater exploitation of knowledge which tends to take place through external collaboration. Maintaining competitive advantage thus necessitates that firms source for knowledge from external sources.

For SMEs external sources of knowledge are more accessible with lower associated costs and risks (Atuahene-Gima, 1993); thus, SMEs' knowledge sourcing strategies rely more on external sources than internal sources of new knowledge. Rammer, Czarnitzki, and Spielkamp (2009) found that SMEs rely more on innovation management tools including sourcing for new knowledge from external sources. They found positive effects on innovation outcome from successfully searching for external sources of innovation among the SMEs in their study. Bierly and Daly (2007) found that external sources of new knowledge had a positive impact on SME capabilities. Leiponen and Helfat (2011) found a strong association between the number of external sources and the probability of innovating.

External knowledge sources include customers, suppliers and research institutions including public research centers and universities, and partnerships with other firms (Bierly & Daly, 2007; Holtbrugge & Bergen, 2004; Leiponen & Helfat, 2011; Segarra-Cipres, Bou-Llusar, & Roca-Puig, 2012). Sourcing from a variety of agents enables a firm to access different types of external knowledge and deepen and widen its knowledge stock (Choi & Lee, 2012; Lin & Wu, 2010; Segarra-Cipres et al., 2012). Among the various sources, vertical partners (customers, suppliers and distributors) and horizontal partners (other firms) are the most frequently used for innovation (Fann & Smeltzer, 1989; Wastyn & Hussinger, 2011). Leiponen and Helfat (2011) found a positive association between new-to-the-market innovation and the extent of external knowledge sourcing. They found that knowledge sourced from customers and suppliers had the greatest impact on innovativeness, followed by knowledge sourced from other firms. Bierly and Daly (2007) also found that sourcing knowledge from customers was a predictor of innovation speed among SMEs. In relation particularly