Knowledge Sourcing Behavior: A Theoretical Model based on Knowledge Base and Network Relationship Perspectives

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ABSTRACT

This study attempts to explore whether, what, and how to conduct the decision making of knowledge sourcing (KS) in firm level, and to clarify the why issue, i.e., the antecedents that determine KS behaviors. Though the theoretical perspectives of knowledge base and network relationship, the study argued that to promote the storage of knowledge and to set up a long-term interactive relationship, especially under mounting pressures of global competition, are quite attractive motivations for firm’s KS behavior. This study develops propositions to support this reasoning of KS model. Some conclusions toward KS practices and future research are provided at last.

Key word: Knowledge sourcing, Knowledge base, Network relationship
INTRODUCTION

According to the literature, knowledge is defined as “justified true belief” (Audi, 1995), and it is understood as information validated by experience. For firm such knowledge defines its capacity to efficiently convert inputs into valuable outputs, and it is usually regarded as a principle source of competitive advantage (e.g., Spender and Grant, 1996). Hence, after the 1990s, knowledge management (henceforth referred to as KM) plays a critical role in the business academy. Most studies, however, have investigated KM on supply-side issues such as sharing, learning, and creating (e.g., Cohen & Levinthal, 1990; Simon, 1991; Nonaka, 1994), while relatively few attentions has been paid on demand for knowledge (Gray & Meister, 2004) such as behavior of knowledge sourcing (henceforth referred to as KS).

As a matter of fact KM needs considerable support from R&D activities and technological infrastructure (Lee & O’Keefe, 1996; Raymond, 2003). Larger firms naturally can afford a great amount of R&D resources; while smaller ones, especially in less-developed countries, find it harder to gain enough and equivalent R&D resources and investment as do their larger competitors. Given the competitive realities and the globalizing environment firms face the most challenge to survive all-time. Thus they must create knowledge faster than their rivals (Prahalad & Hamel, 1990; Teece & Pisano, 1994) and then rapidly translate new knowledge into new product (Grant, 1996). That is why it is very important for firms to concern whether, what, and how to source knowledge in order to free from these pressures.

Let’s take the semiconductor manufacturers in South Korea and Taiwan as an example. Since the capital of the firms in these industries cannot compare to their counterparts in the U.S. and Europe, every independent manufacturer might sacrifice technology or knowledge capability. To raise the technological capability of these firms, the South Korean government sponsors a great deal of R&D funds, employs IC-related experts from Japan and the U.S., brings together firms to internalize their expertise together, and determines the appropriate value-added activities in the global IC value chain. On the other hand, the
Industry Technology Research Institute (ITRI) in Taiwan attracts many IC-related experts coming from the U.S. and Europe to produce excellent technology and patents, and it then transfers and diffuses the technologies to other firms within the industry. The efforts of South Korea and Taiwan make the IC industries very competitive globally.

Apparently knowledge is a principle source of competitive advantage (Spender and Grant, 1996); the good knowledge base of firm can improve competitive advantage and generate new knowledge effectively (Nonaka, 1994; Grant, 1996). In order to promote their storage of knowledge in a base these firms (especially in less-developed countries) endeavor to source knowledge from foreign nations, cultivate their knowledge under others’ guidance, or conduct cross-national knowledge activities such as cooperative R&D, joint knowledge alliance, and even utilizing foreign patents mutually (Radosvic, 1991; Tassy, 1990). Furthermore such KS behavior not only saves more costs and overhead for creating knowledge on their own, but also obtains advantages such as speed and flexibility (McMillan, 1989).

Speaking of these smaller Asian nations, such as Singapore, Taiwan, South Korea, and even Japan, the network relationship (or “Guanxi”) among the firms are tight, inseparable, and sophisticated. Even though their R&D infrastructure is weak, the firms still mutually utilize their knowledge or patents via intensive knowledge interaction and form “knowledge synergy” within the networks. Thus, they are able to produce knowledge advantages jointly to compete with their U.S. and European counterparts (Gardener, 1990; Hu & Jaffe, 2003). With the result that network relationship widely regarded as a means for quick access to resources and know-how that cannot be produced internally (Powell et al., 1996; Powell, 1998; Castilla et al., 2000; Thompson, 2003). Practically many firms have developed excellent knowledge inter-sourcing mechanisms that share valuable knowledge with others inside or outside their national borders.

This study attempts to explore firm’s KS behavior with emphasis on the effects of knowledge base and network relationship. It is important to note that separately regard knowledge base and network
relationship as two important antecedents, and they are used to understand and assess the internality and externality of a firm (‘A course of know yourself as well as enemy’, as the Chinese saying goes). As soon as firms realize their strengths, weaknesses, opportunities and threats, and recognize some knowledge in need. KS model from the perspective of decision-making is established to support them (particularly for multinational enterprises, MNEs) in making decisions of whether, what, and how to source knowledge internally or externally.

The next section, by reviewing literature, covers theory and research framework in the study, followed by a section on conclusion toward KS practices and future research.
LITERATURE REVIEW AND MODEL CONSTRUCTION

Knowledge environment such as explosible growth, extensively dispersed fragment and globalization in which firm embedded nowadays is far and away more complicated than before. It is obvious that the development and management of knowledge has already been different from the past. This is giving the rise of importance for firms in decision-making about how, whether and what to source the valid knowledge. There are many way to source knowledge such as make (research and development by oneself), buy (outsourcing), strategic alliance, joint-venture, and R&D cooperation, etc. But no matter which kinds of KS a firm decides to take, the decision making is deeply influenced by its own knowledge base and network relationship among others.

Types of Knowledge Sourcing Behavior

Based on Harasim’s (1989) argument, Gray and Meister (2004) proposed three different types of KS behavior (dyadic KS, published KS and group KS) for the individual level of analysis. Here we would like to upgrade the level to consider firm’s behavior. Lin, Yen and Tarn (2007) initially proposed the KS model by means of answering four questions. We adapted these four questions in order to correspond to our purpose, they are: (1) Can a firm develop knowledge on its own? (2) Does a firm need to source knowledge from external providers? (3) Does a firm need to source knowledge which is heterogeneous from the existing one? (4) How does a firm manage the interface activities through knowledge? The questions are employed to classify KS model into four modes and named respectively as Knowledge Allocation, Knowledge Development, Knowledge Deal, and Knowledge Initiation (showed as Figure 1).

The first dimension is to classify KS by determining whether KS is executed intra-firm (within the firm), or inter-firm (across the firm). The location for this dimension goes to the judgment of Question (1) and (2) jointly. The second dimension is to classify KS by whether the needed knowledge is homogeneous with or heterogeneous from the existing one, which is judged by Question (3). The
definitions and the related interface activities, which reply to Question (4), describe as follows.

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<td>Intra-firm KS</td>
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<td>Inter-firm KS</td>
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Figure 1. Taxonomy of Knowledge Sourcing Model (adapted from Lin, Yen and Tarn, 2007)

*Knowledge Allocation* is defined as the KS conducted intra-firm while the knowledge is homogeneous with the existing one, and firms may source from their kindred branches / subsidiaries. The term allocation denotes the takers should allocate two matters. The first is to internalize, diffuse, transfer, and universalize what they source from the provider (Nonaka & Takeuchi, 1995; Bonora & Revang, 1991). The second is to assign particular responsibilities, duties, and division of work to KS stakeholders if the sourced knowledge needs to modify to match the taker’s requirement.

In practice the related interface activities are such as: Knowledge Learning and Internalization (Nonaka & Takeuchi, 1995; Sanchez & Heene, 1997; Lincoln, et al., 1998; Sarvary, 1999), Sharing Sourced Knowledge to Members of Knowledge Takers (Cohen & Levinthal, 1990; Ritcher & Vettel, 1995; Davenport & Prusak, 1998; Adams et al., 1998; Simoni, 1999; Birchall et al., 2001; Saggi, 2002; Hu & Jaffe, 2003), Adapting the Sourced Knowledge (Cohen & Levinthal, 1990; Bonara & Revang, 1991), Delegating KS Responsibility and Duty (Niefer, 1990; Drucker, 1993), and Knowledge Circulation (Spek & Spijkervet, 1997; Cohen & Levinthal, 1990; Gardener, 1990).

*Knowledge Development* is defined as KS executed intra-firm while the acquired knowledge is heterogeneous from the existing one. According to Hedlund’s (1994) concept of “T-shape” knowledge,
Knowledge Development could be divided into either knowledge extending or knowledge expanding (Nonaka & Takeuchi, 1995; Sanchez & Heene, 1997; Quintas et al., 1997; Zack, 1999). Knowledge extending occurs when the existing knowledge is stretched in vertical manner, in which the knowledge has been developed to a deeper, more profound, and more perspicacious state. On the other hand, knowledge expanding occurs when the existing knowledge is broadened in horizontal manner, in which the knowledge has been altered to a more transverse, integrating, and diversifying state (Hedlund, 1994; Nonaka & Takeuchi, 1995; Quintas et al., 1997; Powell, 1998; Zack, 1999). As what Sanchez & Heene (1997) mention, the shorter knowledge life span gets, the more essential to stretch knowledge development becomes (Bierly & Chrkrabarti, 1996).

In practice the related interface activities are such as: Knowledge Keeping-pace (Hamel, 1991; Sanchez & Heene, 1997), Knowledge Extending (Leonard-Barton, 1995; Bierly & Chrkrabarti, 1996; Teece, 1998), Knowledge Expanding (Nonaka & Takeuchi, 1995; Leonard-Barton, 1995; Grant, 1996; Bierly & Chrkrabarti, 1996), and Knowledge Integrating (Lex, 1995; Huang et al., 2001; Sherman, Berkowitz & Souder, 2005).

**Knowledge Deal** is defined as the KS activities preceded inter-firm while the knowledge is homogeneous with the existing one. The dynamic and changing environment makes knowledge cheap and easy to imitate, intra-firm KS may be insufficient to sustain the advantage permanently. Thus, even across national border, inter-firm KS via knowledge procurement, interchange, cooperation, among others, may be proper alternatives to prolong knowledge life and advantage.

In practice the related interface activities are such as: Knowledge Interfacial Management (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995; Leonard & Spensiper, 1998; Cohen, 1998; Krogh, 1998; Hargadon, 1998; Song et al., 2003), Knowledge Procurement (Radosvic, 1991; Smith & Wolfe, 1995; Fransman & Tanaka, 1995; Ruggles, 1998; Hargadon, 1998; Sarvary, 1999), Knowledge Cooperation (Powell, 1998; Hargadon, 1998; Brown & Duguid, 1998), especially cross-cultural knowledge cooperation.
Knowledge Initiation is defined as the KS activities processed inter-firm while the acquired knowledge is heterogeneous from the existing one. Knowledge Initiation represents much more sophisticated and difficult than the other KS modes. Most KS here requires major anticipation (if not “guess”), coordination, connection, and innovativeness under such conditions of unpredictability, risk, and chaos. Accordingly, knowledge managers have to inspect the environment, originate the initiation concepts, coordinate the orientation, determine rules of the new game, pioneer the product prototypes (Radosvi, 1991; Lepkowski, 1993; Freemantle, 1996; Bierly & Chakrabarti, 1996), and set up the scale, standard, and the outcomes (such as products, patents, etc.).

In practice its related interface activities are such as: Concentrating Existing Conditions by Sourcing New Knowledge, Circumscribing Knowledge for New Market/Customers (Radosvic, 1991; Lex, 1995; Mowery & Rosenberg, 1989; Nonaka & Konno, 1998), Prototyping Knowledge for New Products/Services (Williamson, 1975; Sapienza, 1989; Radosvic, 1991; Bierly & Chakrabarti, 1996; Mowery & Rosenberg, 1989; Nonaka & Konno, 1998), and Starting Brand New Knowledge Domain (Sapienza, 1989; Freemantle, 1996; Inkpen & Dinur, 1998; O’Connor, 1998; Sarvary, 1999).

Antecedents of Knowledge Sourcing

As the Chinese saying goes, to know the enemy and know yourself and you can fight a hundred battles with no danger of defeat. This study separately regards knowledge base (a course of know yourself) and network relationship (a course of know the enemy) as two antecedents of KS behavior, and they are used to understand and assess the strengths, weaknesses, opportunities and threats of firm.
Knowledge Base Perspective

KM is widely discussed in the management literature. Verkasalo and Lappalainen (1998) define three schools of thought on KM. They are knowledge-creating school, core-competence school and knowledge-base school.

The knowledge-creating school represented by Nonaka (1994), identifies the different type of knowledge (tacit or explicit knowledge) and shows how to transform one type into the other, emphasizing the role of middle management in this process. The concept of absorptive capacity (Cohen and Levinthal, 1990) is closely related to the knowledge-creating school since it concerns the assimilation of new knowledge.

The core-competence school, using a resource-based approach, studies how the competencies at the firm’s disposal can be made to contribute to its performance (Hamel and Prahalad, 1994). Transfer and integration successful are considered if it makes short- or long-term contributions to business decisions.

The knowledge-base school promotes the storage of knowledge (expert system) from which nonexperts may retrieve it by means of a reasoning engine and thereby may solve problems beyond their expertise. The construction and maintenance of such a knowledge base, however, requires considerable support from R&D activities and technological infrastructure (Lee & O’Keefe, 1996; Raymond, 2003). Given the competitive realities and the globalizing environment firms face the most challenge to survive all-time. Hence, as soon as demanding a new service or technology firms have to efficiently and effectively do a decision-making of KS according to their current storage of knowledge.

The boundaries of firm should encompass its valuable competencies and core knowledge (Argyres, 1996; Prahalad & Hamel, 1990). The emerging literature on the knowledge-based view of the firm not only explains why firms exist by articulating the knowledge-based advantages of hierarchy (Conner & Prahalad, 1996; Kogut & Zander, 1996) but also when firms exist and what form (Nickerson & Zenger,
Many studies even point out that the firms’ practices toward generation of knowledge can have substantial effects on their performance (e.g. Conner, 1991; Teece, Pisano, and Shuen, 1997).

Knowledge is a principle source of competitive advantage (Spender and Grant, 1996); the good knowledge base of firm can improve competitive advantage and generate new knowledge effectively (Nonaka, 1994; Grant, 1996). But due to the difference on organizational goal, characteristics, human resources and competitive strategy, firms ought to be careful in implementing KS method. Based on knowledge-based perspective, therefore, by mean of promoting the storage of knowledge to increase competitive advantage is an attractive motivation for firm’s behavior of KS.

P1: There has an association between the knowledge base and decision-making behavior of knowledge sourcing; moreover, to promote the storage of knowledge is an attractive motivation for firm’s behavior of KS.

**Network Relationship Perspective**

According to literature organizational network is the long-term relation between two or more firms, in which the relation has neither built on functions of market nor on formal bureaucracy. Nevertheless, it is widely regarded as a means for quick access to resources and know-how that cannot be produced internally (Powell et al., 1996; Powell, 1998; Castilla et al., 2000; Thompson, 2003). In general, the long-term relations between firms can lead to developing trust (Gulati, 1995; Gulati and Gargiulo, 1999), to learning about each other’s competencies (Gulati and Gargiulo, 1999), and to developing common and redundant knowledge and understanding (Ahuja, 2000; McEvily and Zaheer, 1999). In addition, relational research suggests that strong, embedded ties between an organization and its external partners motivate open exchange of proprietary information and increase the ability to exchange rich, complex information, which is so important in new product development (Gulati, 1995; Hansen, 1999; Rindfleisch and Moorman, 2001; Rowley et al., 2000).
Network relationship mainly relies on transaction cost theory. By means of network relationship firm can share the risk and R&D cost. That is when the activity cost of firm is greater than outside purchasing, the cooperation mechanism produces to learning from each other and to save cost (Hamel, 1991). Besides in turbulent and resources-decreasing environment the network relationship becomes an important way to gain resource.

Technological change has facilitated a division of "knowledge labor" and with that exchange of knowledge among firms is both a social relationship and a business transaction in which money changes hands. Additionally such relationship is not confined to a view of vertical network ties as power relationships, it is the practice of seeking complementary capabilities to set up and increase firms’ common interests. This viewpoint coincides with Zack’s (2003) argument that customers and interest group are also as important sources of knowledge except internality of firm or cooperative partners. That is to say that the extensive and systematic KS behavior is in need and it should bring benefits to firm.

This study defines network relationship as a long-term interactive relationship that set up in order to obtain extensive knowledge and interests effectively, and no limitation on its network targets. In the meanwhile, to regard network relationship as an assessment of firm’s externality is just to echo the Chinese saying, ‘a course of know your enemy’.

P2: There has an association between the network relationship and decision-making behavior of knowledge sourcing; moreover, to set up a long-term interactive relationship is an attractive motivation for firm’s behavior of KS.
Research Framework

According to above mentioned, Figure 2 shows the conceptual framework guiding the present study. It is important to note that separately regard knowledge base and network relationship as two important antecedents of KS behavior. Four modes of KS model from the perspective of decision-making is established to support firms in making a decision of whether, what, and how to source knowledge internally or externally.

![Figure 2. Research Framework](image-url)
CONCLUSION

This study that follow provide theoretical insight and build a more comprehensive understanding of KS behavior. The model not only explores whether, what, and how to conduct the decision making of KS, but also clarifies the why issue, i.e., the antecedents that determine KS behaviors. As claimed in proposition 1 and 2, especially in this globally competitive environment, to promote the storage of knowledge and to set up a long-term interactive relationship are quite attractive motivations for firm’s KS behavior. Although, according to the literature, the other possible factors may include the taker’s R&D resources, market heterogeneity or the need for localizing the sourced knowledge, and the relative position between takers and providers, among others. Future studies could pay efforts to these potential factors.

As an academic article, however, this study still remains a lot to be learned. A crucial early step is to empirically test the reliability and validity of the model. For example, the KS Model is assessed via going through by four questions, several decision-making research techniques and methodologies (such as Automatic Interaction Detector, AID, and AHP) might be some potential ways to verify the KS model. Future research could endeavor to design the measurement scale or interviewing checklist, and accordingly test whether this model matches the KS practices.
REFERENCE


