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BUSINESS VALUE OF INFORMATION TECHNOLOGY IN A NETWORK ENVIRONMENT

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Abstract

Business value of information technology (IT) continues to be an important issue for both practitioners and academic scholars. Most IT business value literature focuses on the scope of an individual firm and overlooks the impact of the network environment it resides in. On the other hand, interorganizational system (IOS) studies tend to rely on a single information system and fall short on providing a complete picture of IT business value in a network environment. This study extends current IT business value models with explicit inclusion of the network environment factors and examines effects of IT resources on network capabilities and firm performance. Considering theories of dynamic capabilities, flexible specialization, and social network, we propose that IT resources are directly related to both network characteristics and network capabilities. In turn, these network characteristics and capabilities affect firm performance. By referring to different theoretical bases and proposing a nomological model, we advance current IT business value research and provide guides for IT practitioners.This study is planned with both archival and survey data in large, multidivisional and multinational companies in high-tech industries.

Keywords: IT business value, network, dynamic capabilities, flexible specialization, firm performance.

1 INTRODUCTION

Business value of information technology (IT) continues to be an important issue for both practitioners and academic scholars (Lee, 2006). Most IT business value literatures focus on the scope of an individual firm even though they acknowledge the impact of competitive environment on IT value (Melville, Kraemer, & Gurbaxani, 2004) and suggest that firms build dynamic capabilities through their internal IT resources to adapt to the rapidly changing environment (Sambamurthy, Bharadwaj, & Grover, 2003). However, as Buytendijk (2009) points out, "the vast majority of decisions that impact a company's profitability are made outside its walls". There exists a performance network consisting of stakeholders that influences individual firm performance. Indeed, in network literature, networks have been regarded as a locus of resources, providing potential conduits and complementing firms' internal resources (Chi, Holsapple, & Srinivasan, 2007). In today's rapidly changing environment, firms have been forced to seek new competitive approaches from networks, such as dynamic network (Miles & Snow, 1986), value-adding partnership (Johnston & Lawrence1988), flexible specialization (Piore, 1992), and virtual organizing (Venkatraman & Henderson, 1998).

One form of information system, interorganizational system (IOS) has been studied for fitting the emerging environment (Robey, Im, & Wareham, 2008). While past IOS researches covered a batch of important issues (e.g., IOS adoption, governance structure, and organizational consequences), the focus of single information systems seems insufficient to reflect the expected role of IT in these above-mentioned new competitive approaches. Proposals, such as "IT platform" (Venkatraman & Henderson, 1998) or "dominant technology" that supports economic growth (Piore, 1992) have been used to address innovative roles of IT beyond a single system.

Popular perspectives on IT business value, such as resource-based view (RBV) (Bharadwaj, 2000; Santhanam & Hartono, 2003) and industry positioning (Porter, 1980, 2001), have overlooked the important fact that the advantages/disadvantages of an individual firm are often linked to the advantages/disadvantages of its associated network in today's competitive environment (Dyer & Singh, 1998). As Nohria (1992) points out, "all organizations are in important respects social networks and need to be addressed and analyzed as such". The traditional assumption that organizations are pursuing maximum benefits has been challenged by network researchers (Nohria, 1992; Uzzi, 1996). An alternative rationality, which focuses on network relationships of organizations, has been offered to explain IS interaction processes (Kumar, Dissel, & Bielli, 1998). Thus, we believe that it is essential to extend the current focus of IT value research with explicitly and coherently incorporating network and environment to obtain a complete understanding.

The purpose of this study is to investigate the business value of IT in a network environment and advance current IT business value research by incorporating diverse theoretical bases and providing empirical evidence. We believe such extension is instructive and necessary from many important perspectives. First, numerous researchers suggest that organizational networking has become a trend (Daley, 2008; Pentland & Feldman, 2007). Second, IT should contribute to firm performance not just by single or isolated IT competencies, but through electronic integration (Sambamurthy et al., 2003). In other words, e-integration of IT competencies should represent major contribution to firm performance. Third, a perspective of firms as interdependent organizations that represent social knowledge of coordination and learning (Kogut & Zander, 1996) seem to be more promising for IT business value research in a network environment. Fourth, the core of dynamic capabilities has been shifted from configuring internal resources to deploy resources inside a network (Gnyawali & Madhavan, 2001). Therefore, the research questions of this study are:

- What are the business value of IT in the network environment? Specifically, how can IT capabilities of firms facilitate or nurture necessary dynamic capabilities in the network environment to improve business values and performance?
- What are the relationships between IT and network structure on IT business value? How does a perspective of organizational networking contribute to IT business value research in a network environment?

2 THEORETICAL BASES

2.1 Theories of IT and Firm Performance

Literatures of IT value on firm performance are mostly based on four theoretical perspectives: position perspective(Porter, 1980, 2001), transaction cost perspective (Williamson, 1985), resource-based view (Barney, 1991), and dynamic capabilities perspective (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997). Position perspective asserts that firms should develop their strategies around an integrated system of activities that give them an attractive position relative to competitors (Bhatt & Grover, 2005). Here the position not only establishes the uniqueness and value of firms' products and service (Porter, 2001), but also locks-in firms and constrains their strategic mobility (Ghemawat, 1991). The role of IT is in facilitating the superior position by supporting strategic activities such as pricing (Beath & Ives, 1986) and customer relationship management (Porter & Milar, 1985). But this perspective has several limitations. First, it assumes that firm structure as static and firms as homogeneous in their abilities (Bhatt & Grover, 2005), and provides weak explanation of strategic activities in dynamic environment (Sambamurthy et al., 2003). Second, it doesn't explain how strategic activities are inimitable (Sambamurthy et al., 2003).

The core of transaction cost perspective is asset specificity, such as physical proximity, transaction-specific capital investments, and transaction-specific know-how (Williamson, 1985). This perspective argues that firms must do specialized strategic investment to develop a competitive advantage (Amit & Schoemaker, 1993), and is frequently used to explain institutional governance. It works through a discriminating alignment hypothesis that transactions with different asset attributes (generic versus specialized) should be aligned with different governance structures (markets versus hierarchies (Wareham, 2003). In strategy literature this perspective has been used to explain the relationship between relation-specific investments and performance (Dyer, 1996). The role of IT in transaction cost perspective include reducing product complexity, lowering external search costs, and reducing asset specificity (Robey et al., 2008). The transaction cost perspective also suffers from several criticisms. First, its intrinsic assumption and scope are too narrow to justify its continued, all-encompassing application in managerial and social area (Wareham, 2003). Second, this perspective provides little insight on how the asset-specific investment cannot be imitated (Bhatt & Grover, 2005).

The resource-based view (RBV) has been used in numerous studies to explain the relationship between IT and competitive advantage/firm performance (Bhatt & Grover, 2005). This perspective treats firms as bundles of resources and assumes that those resources are heterogeneously distributed across firms and that resource differences persist over time (Eisenhardt & Martin, 2000). When firms own resources that are valuable, rare, inimitable, and nonsubstitutable, they can implement a value creating strategy that cannot be easily duplicated by competitor and achieve sustainable competitive advantages (Barney, 1991). Despite of its popularity, this perspective is also suffered from some limitations. First, it provides a set of necessary conditions for achieving sustainable competitive advantages, but says little about how resources actually contribute to these advantage (Melville et al., 2004). Second, in dynamic business environment, sustainable competitive advantages have been seen as unlikely (Eisenhardt & Martin, 2000). Finally, it doesn't cover issues such as skill acquisition and learning (Teece et al., 1997).

The dynamic capabilities perspective can be seen as an extension of resource-based view (Eisenhardt & Martin, 2000). Unlike RBV, which focuses on an economic and formal modeling lens (Barney, 1991) and is criticized as "conceptually vague and tautological" (Priem & Butler, 2000), dynamic capabilities perspective assumes on empirical base and focuses on specific strategic processes, such as product development and strategic decision making that have extensive empirical research associated with them (Eisenhardt & Martin, 2000). The dynamic capabilities perspective asserts that competitive advantages come from resource configuration, or the ability of firms to integrate, build, and reconfigure internal and external resources to adapt to rapidly changing environments (Teece et al., 1997). The effective patterns of dynamic capabilities vary with market dynamism and evolve through specific learning paths (Eisenhardt & Martin, 2000). This perspective is important to this study because IT has been argued as an enabler of dynamic capabilities (Sambamurthy et al., 2003).

Dynamic capabilities perspective implicitly and explicitly considers both internal and external resources for firms to adapt to environments and underlies net-enabled organizations studies (Barua, Konana, Whinston, & Yin, 2004; Wheeler, 2002).

The four perspectives discussed above provide useful insights for IS academic scholars and practitioners to understand IT business values in organizational environment. However, as we can see, they suffer from different limitations and may fail to provide feasible guides in some situations, such as in a network environment. There is a exponential increase in network research (Borgatti & Foster, 2003). Researchers have observed "New Competition" (Best, 1990), where interdepdenent companies reply on some new competitive approaches, such as dynamic network (Miles & Snow, 1986), value-adding partnership (Johnston & Lawrence1988), flexible specialization (Piore 1992), and virtual organizing (Venkatraman & Henderson 1998). But the business value of IT in a network environment is still blurred, even though researchers have argued that the new competitive approaches have to be based on IT (e.g., Piore, 1992; Venkatraman & Henderson, 1998). Moreover, to explore the business value of IT in a network environment, it seems necessary to combine theories of networking, such as flexible specialization and social network theory, into existing theoretical perspectives on IT business value.

2.2 Theories of Networking

At firm level, flexible specialization is defined as "the manufacture of a wide and changing array of customized products using flexible, general-purpose machinery and skilled, adaptable works" (Hirst & Zeitlin, 1991). However, this concept is suitably used at network level and describes a form of industrial organization where production is organized around the interactions of a network of small firms, such as 'industrial districts' and large, decentralized companies (Stroper & Christopherson, 1987). In a flexible specialization network, each firm or productive unit is specialized on some small area, but the whole production system is flexible because there are many possible combinations of specialized input-providing firms (Piore & Sabel, 1984). The characteristics of flexible specialization include a wide range of products for highly differentiated markets and the constant adaptation of goods/services in order to expand markets (Starkey & Barnatt, 1997). Although the research stream of flexible specialization has been rarely cited in IS research, its concepts have been argued to underlie the current popular organizational forms such as network (Piore, 1992) or virtual organizing (Venkatraman & Henderson, 1998). The limitation of flexible specialization is that it tends to only provide a suggestive guide at some macro-level to broad trends in industrial reorganization, rather than testable hypotheses at the micro-level (Hirst & Zeitlin, 1991).

The perspective of social network theory argues that a network form of organizations is a viable pattern of economic organization with unique logics of communication and exchange (Borgatti & Foster, 2003). Compared with market and hierarchy form, the network form is more dependent on relationships, mutual interests, and reputation, and is especially useful for the exchange of intangible commodities, such as know-how and technological capability (Powell, 1990). The perspective of social network theory acknowledges the existence of opportunism behaviors; but it regards these behaviors as nonomnipotent (Wareham, 2003) and emphasizes on shared benefits and burdens (Powell, 1990) . The basic assumption here is that "one party is dependent on resources controlled by another, and that there are gains to be had by the pooling of resources" (Powell 1990). There are several criticisms for social network theory. First, it focuses on relationships at the expense of other concerns, such as politics and institutions (Smith-Doerr & Powell, 2003). Second, the definition of reciprocity, one of the core concepts of social network theory, is rather ambiguous (Powell, 1990). Finally, the focus on structure of relationships treats all ties as comparable, without regard to their content or context (Goodwin & Emirbayer, 1994).

3 RESEARCH MODEL AND HYPOTHESES

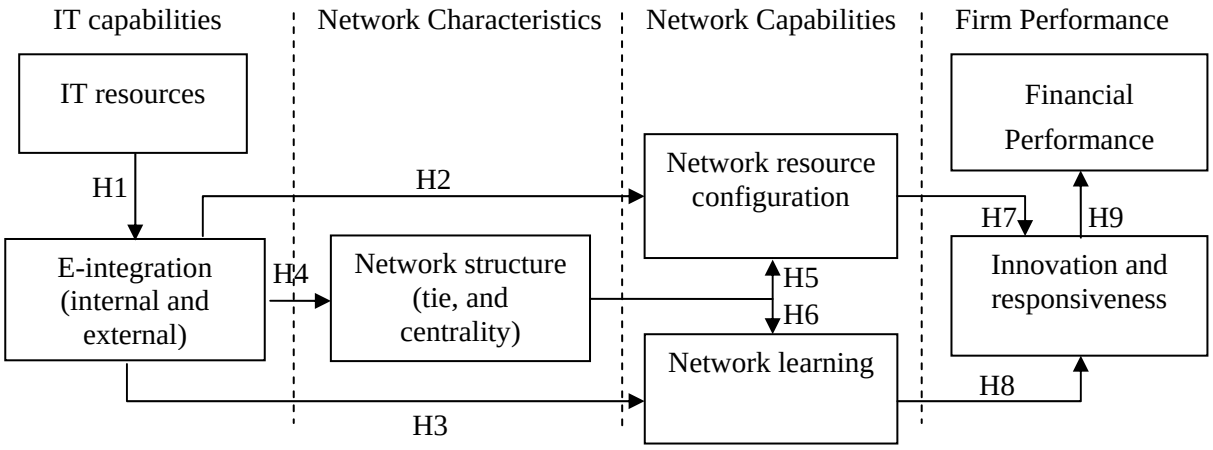

Figure 1. Research Model

Figure 1 shows the research model of this study. We argue that IT capabilities are directly related to both network characteristics and network capabilities. In turn, these characteristics and capabilities affect firm performance. We discuss these relationships in details and develop corresponding hypotheses as follows.

Accompanying with the dominance of resource-based review on competitive advantages literature, current IT business value studies focus on various independent variables, such as IT capabilities (Bharadwaj, 2000; Santhanam & Hartono, 2003), IT competence (Sambamurthy et al., 2003), or IT resources (Melville et al., 2004; Piccoli & Ives, 2005). In this study we treat IT capabilities as integrated IT resources, which comprise both technological and human IT resources (Melville et al., 2004), and as an enabler of other capabilities, such as strategic initiatives (Piccoli & Ives, 2005), and agility and digital option (Sambamurthy et al., 2003). In a network environment, the role of IT is expected as not only separate components, such as applications, skills, or infrastructure, but also a platform that can support virtual asset configuration and knowledge leverage (Venkatraman & Henderson, 1998). To describe this role of IT, we expend the concept of digital options (Sambamurthy et al., 2003) into *electronic integration* (e-integration) and define it as a set of IT-enabled capabilities in the form of integrated enterprise work processes and knowledge systems. E-integration can happen inside a firm and inside a network. We argue that for obtaining competitive advantages in a network environment, both internal and external e-integrations are needed. Literature on IT value and competitive advantages has focused mainly on the internal e-integration (Francalanci & Maggiolini, 2002; Sambamurthy et al., 2003). Nevertheless, the research on interorganizational systems (IOS) suggested the importance of external e-integration on firm performance (Gallivan & Depledge, 2003; Robey et al., 2008). Thus,

- Hypothesis 1a. IT resources facilitate internal e-integration.
- Hypothesis 1b. IT resources facilitate external e-integration.

Literature on dynamic capabilities reveals two key factors to pursue competitive advantages in a network environment. One is the capabilities in "appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment " (Teece et al., 1997). The other is the capabilities to "renew competences so as to achieve congruence with the changing business environment". In this study, we use two terms-- network resource configuration and network learning--to describe these capabilities in a network environment. We define *network resource configuration* as the ability of a firm to assemble and coordinate the required resources in a network for production activities. We refer *network learning* to the ability of a firm to renew its competencies and improve performance within a network.

The concept of network resource configuration is rooted in the assertion of network literature that networks are loci of resources (Dyer, 1996) and the proposition of virtual organizing literature that firms should focus on their core competencies and obtain complementary assts through interfirm relationships (Venkatraman & Henderson, 1998). The congruence of the two research steams is that performance of a firm is a function of its own resources, and external resources that reside in its network (Gnyawali & Madhavan, 2001). How a firm assembles and coordinates the required resources inside a network for production activities is a key factor for obtaining competitive advantages in a network environment.

The virtual organizing literature provides scenarios how e-integration can support network resource configuration (Venkatraman and Henderson 1998). First, IT can support sourcing standard models or components in the form of electronic data interchange (EDI), Web site, and trading process network. Second, IT is the backbone of process outsourcing, where firms outsource their information intensive business process, such as accounting, to external specialists without loss of control. Third, IT can provide electronic exchange platforms, such as B2B, to support resource coalitions where firms become part of a dynamic network of complementary capabilities. In all these scenarios, it is clear that both internal and external e-integrations are needed for network resource configuration. Thus,

- Hypothesis 2. E-integration facilitates network resource configuration.

The role of network learning can be understood in the light of resource-based perspective. The core of resource-based literature is the assumption that a firm not only is a governance entity, but also functions as a repository of technological and organizational knowledge (Foss, 1996). That is, a firm can learn and grow on the basis of its knowledge (Dosi, Winter, & Teece, 1992). In a network environment, part of the value of a firm derives from its participation in a network and its competitive capabilities rest on not only its own knowledge, but also its capabilities of coordination and learning inside the network (Kogut, 2000). Firms cannot only be a passive recipients of knowledge but must learn how to transfer knowledge across the boundaries of the network (Powell, Koput, & Smith-Doerr, 1996).

The role of e-integration in network learning has been widely argued by IS scholars. According to Scott (2000), electronic links can facilitate both lower and higher levels of interfirm learning. Lower-level learning focuses on some rudimentary association of behavior and outcomes and high-level learning aims at adjusting overall rules and norms (Fiol & Lyles, 1985). For lower level learning, electronic adaptive learning systems can promote greater efficiency using explicit knowledge by adjusting to stimuli and providing fast feedback (Levinson & Asahi, 1995). At the higher level learning, collaboration based on e-integration can catalyzes the learning process by stimulating reconsideration of current practices through a benchmark process (Dodgson, 1993). Therefore, e-integration can facilitate both levels of learning across the network (Scott, 2000). Thus,

- Hypothesis 3. E-integration facilitates network learning.

Scholars have reported the lack of IT value research on organizational network (Tafti, Mithas, & Krishnan, 2008) and insufficient theoretical bases to explain IS phenomena in network environment (Wareham, 2003). This is a surprise if we relate these problems to the surge of network research in organizational literature. The consequences of these problems could be significant, such as failure of interorganizational system adoption (Kumar et al., 1998) and inability to predict firm IT-related behaviors (Bakos & Brynjolfsson, 1993). In this study we take a perspective of social network theory (Powell, 1990) with emphasis on two variables, strength of network tie and network centrality because past IS studies have indicated their relevance to IS phenomenon (Chi et al., 2007; Gallivan & Depledge, 2003; Kumar et al., 1998).

Tie is a link or connection between two actors inside a network (Smith-Doerr & Powell, 2003). The strength of tie indicates the relationship between actors. Past literature has revealed two roles of interorganizational system (IOS) on partner relationship: monitoring and collaborative (Gallivan & Depledge, 2003; Scott, 2000). Collaborative use of IOS is suggested to relate to positive interfirm-relationship, but the consequence of monitoring use of IOS is inconsistent. Some authors argued that monitoring use of IOS indicates an attention of control, implies distrust, and causes negative relationship among partners (Gallivan & Depledge, 2003). Other authors distinguished cognitive and

affective trust and argued that monitoring use of IOS can increase operation transparency, reduce risk, and facilitate cognitive trust and cause a positive relationship (Scott, 2000). In this study we take the second perspective because we conjecture that collaboration may happen between distant acquaintances in a network so that monitoring use of IOS is needed in this situation. On the other hand, when close ties enter into collaboration, monitoring use of IOS may be unnecessary because of existence of strong tie. Thus,

- Hypothesis 4a. External e-integration increases strength of network ties.

Network centrality refers to "the extent to which the focal actor occupies a strategic position in the network by virtue of being involved in many significant ties" (Gnyawali & Madhavan 2001). Centrality in a network generally indicates power (Bonacich, 1987). It has been argued that the most important actors are usually located in strategic central locations within a network (Cucchi & Fuhrer, 2007). There are many dimensions of centrality, such as degree, betweenness, and closeness (Freeman, 1978). In this study we focus on two dimensions: degree centrality, which measures "the extent to which a focal firm is connected with other firms in a network", and between centrality, which indicates "the extent to which a focal firm falls on the shortest paths of pairs of other firms in a network" (Chi et al., 2007).

Past study has proposed that use of IOS is positive related to high centrality in a network because extensive use of IOS helps a firm obtain knowledge and experience in managing technological infrastructure, explore IOS-based innovation, and engage in new activities or establishing relationships (Chi et al., 2007). We extend this proposition and argue that both external and internal e-integrations are positively associated with high centrality. The internal e-integration indicates the extent that a firm digitizes its process and knowledge management system. It can be assumed as a necessary condition for external e-integration because pure electronic links without internal e-integration cannot generate efficient coordination. Moreover, digitalized process and knowledge systems indicate technological readiness of a firm for external e-integration (Iacovou, Benbasat, & Dexter, 1995) and may attract potential partners. Thus,

- Hypothesis 4b. E-integration increases network centrality.

The relationship between network ties and network resource configuration seems to be complex because they work with different theoretical bases and may have different priorities and objectives. Network resource configuration is based on dynamic capabilities perspective and focuses on efficiency. That is, how firms efficiently assemble and coordinate network resources has the highest priority. Network tie is based on social network theory, which doesn't admit efficiency as the only goal of network interaction. For example, an employer may hire a close friend with a little weak capability other than a stranger with strong capability. Moreover, relationship can become a goal of social interaction (Uzzi, 1996). For example, the concern of relationship with suppliers caused firms to reduce the number of suppliers at the expense of losing bargaining power (Bakos & Brynjolfsson, 1993). In a network environment, some types of ties are certainly needed for seamless cooperation and coordination. But too strong ties may cause resource configuration less optimal because here relationship may impede efficiency. Thus,

- Hypothesis 5a. Weak ties facilitate network resource configuration.

Network centrality has been argued to lead higher volume and speed of resource flow (Galaskiewicz, 1979). According to Gnyawali & Madhavan (2001), there are several explanations for this argument. First, a centrality of position implies greater access to external resources from connected actors. Second, a centrality of position implies larger number of information sources and quicker access of new information and important technology developments. Third, a centrality of position generally indicates power. Following the reasoning, we propose that a firm with a central position can configure external resources more efficiently because it has more access to resources, has quicker access to both demand information and new innovation information, and has power to execute resource configuration according to its needs. Other authors also argue that firms occupying a central position in a network have advantages than others to access information and resources (Smith-Doerr & Powell, 2003). Thus,

- Hypothesis 5b. Network centrality facilitates network resource configuration.

Some researchers have argued that firms prefer alliance to acquisition because knowledge is hard to be bought and has to be learned (Powell et al., 1996). Indeed, learning alliances have become an important class of interfirm alliances (Khanna, Gulati, & Nohria, 1998). Yet the process and consequence of learning inside a network can be very different, depending on firms' positions and their relationships with others. Some authors propose a learning race, where firms try to learn as fast as they can to avoid being kicked out by their faster-learning partners (Khanna et al., 1998). But others argued that learning is the basic function of a network and also a resource of other alliance relationships (Powell et al., 1996). From our point of view, the learning race occurs because there is no a strong social tie between partners.

We argued that there are two mechanisms under learning: economic exchange and reciprocity. With existence of strong tie, learning is governed by reciprocity; without strong tie, learning can be just an economic exchange and learning race can happen. On the other hand, network literature has indicated that close ties do not result in sufficiently fresh assessments of information (Smith-Doerr & Powell, 2003). For efficient learning in a network environment, strong tie is needed for complex communication, especially for high level learning (Scott, 2000) and weak tie is also needed for efficient information research (Smith-Doerr & Powell, 2003). Thus, a mix of weak and strong tie seems to be preferred for network learning.

- Hypothesis 6a. A mix of weak and strong ties facilitates network learning.

As we have discussed, a central position in a network has advantages on resource access, information acquisition, and control power over others (Gnyawali & Madhavan, 2001). For network learning, a central position has more implications (Powell et al., 1996). First, a centrality of position shapes a firm's reputation and generates visibility. It enhances a firm's ability to attract new partners. Second, firms with a central position can have more timely access to new resources and have more chances to get connected and earn collaborative experience. In turn, their central position can help them exploit the experience. Finally, experience at managing existing partnerships can help a firm quickly indentify new projects and obtain growth by funneling them inside the firm. Empirical study has indicated that prior experience is an important indicator of following collaboration (Gulati, 1999). Because network learning is based on partnerships, the advantages of a central position on identifying, developing, and managing partnerships can also facilitate network learning. Thus,

- Hypothesis 6b. Network centrality facilitates network learning.

We define *innovation* as a new way of organizing production activities to generate benefits, such as new products or services, and cost reduction, and r*esponsiveness* as the speed that a firm can respond to market requirements. Flexible specialization literature describes how network resource configuration can contribute to innovation and responsiveness. For knowledge progress, firms need to specialize in some small area for deepening of knowledge (Piore, 1992). But the rapidly changing market requires a broad band of products with a shorten life-time (Teece et al., 1997). The conflict between knowledge-based specialization and market-based product diversity can be solved for firms by involving a flexible specialization network, where they change the combination of outputs from different firms to allow pursuing both specialized knowledge and a diversity of products at the same time. Virtual organizing literature (Venkatraman & Henderson, 1998) also argues that a firm doesn't need to dominate all others in a network. Every firm can focus on one set of resources and obtain complementary resources from others. Competitive advantages come from the capability of configuring resources in a network. Thus,

- Hypothesis 7. Network resource configuration facilitates innovation and responsiveness.

Unlike RBV, dynamic capabilities literature disputes the existence of sustainable competitive advantages in a changing environment and puts significant emphasis on learning (Eisenhardt & Martin, 2000). Network literature argues that firms need to learn inside a network for innovation (Powell et al., 1996). The flexible specialization literature also emphasizes the role of learning but from different angles. According to Piore (1992), there are three ways to make economic growth. First is specializing on some small area to obtain new knowledge. Second is transferring the ways to integrate economic activities from one area to another area. The third is inventing new ways to integrate economic activities. Thus, there is a need to know types of knowledge and who own

knowledge to facilitate knowledge transferring in a network. In other words, learning can be an intrinsic attribute of a flexible specialization network. Thus,

- Hypothesis 8. Network learning facilitates innovation and responsiveness.

In this study, we choose financial performance as the dependent variable for several reasons. First, financial performance provides an objective and simple measurement of firm performance. Second, financial performance is a commonly acceptable tool for all firm stakeholders. Third, better financial performance is also one of the most important goals for most firms. The relationships between innovation and responsiveness and financial have been intuitive. Thus,

- Hypothesis 9. Innovation and responsiveness are positively related to firm financial performance.

4 METHODOLOGY

This study is planned with both archival and survey data in large, multidivisional and multinational companies in high-tech industries, such as integrated circuits industry, semiconductor, and telecommunications equipment, where fierce and continuous competition is the norm (Vanhaverbeke, Duysters, & Noorderhaven, 2002). Multidivisional and multinational companies are structured into a number of fairly autonomous operating divisions that are responsible for product development, manufacturing, and sales. There are several reasons for the choice. First, multinational companies have been conceptualized as an interorganizational network and investigated with interorganization theory (Ghoshal & Bartlett, 1990; Hansen, 1999, 2002; Tsai, 2001). Second, a large proportion of operating division were organized according to a specific sector and constitute a natural membership boundary (Hansen, 1999), which fits the membership criterion used in network research (Marsden, 1990). Third, collecting network data within large companies seems to have higher completion and accuracy than collecting data based on announcements or news of companies (e.g., Tafti et al., 2008) .

The respondents will be managers of the divisions or someone who holds similar position necessary for knowledge of the whole situation of the division and also relationships with other divisions. A site visit is planned for conducting initial semi-structured interviews with engineers and managers to better understand the context and to develop survey instruments that would be valid in this setting. Information from different informants in a same division will be used to cross-validate data.

5 EXPECTED CONTRIBUTION

This study aims to make both theoretical and empirical contributions to IT business value research. First, it makes theoretical contribution by referring to diverse theoretical bases which help explain the impact of a network environment. Past studies have indicated that traditional theoretical bases of IS research are insufficient to explain IT phenomena in a network environment (Kumar et al., 1998) and called for new theoretical bases (Robey et al., 2008). This study is a response to this call. Second, there is a surprising lack of IT value research in network environment (Tafti et al., 2008). This study provides a useful supplement by extending current conceptual models (e.g., Sambamurthy et al. 2003 and Melville et al. 2004) with explicit inclusion of network factors in our proposed nomological IT business value model. Third, this study provides empirical supports to current IT business value literature and also practical guides for IT practitioners to adapt to today's rapidly changing environment.

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