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Ganesh D. Bhatt  
*Morgan State University*

Jatinder N. D. Gupta  
*The University of Alabama in Huntsville*

Sushil K. Sharma  
*Ball State University*

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# **Integrating IT-Enabled Social Networks with Transaction Cost Economics and the Resource Based View of the Firm**

**Ganesh D. Bhatt**  
**Morgan State University**

**Jatinder N. D. Gupta**  
**The University of Alabama in Huntsville**

**Sushil K. Sharma**  
**Ball State University**

## **ABSTRACT**

*Prior research has mostly focused on transaction cost economics (TCE) to interpret the effect of information systems (IS) on organizational governance structures. A TCE based approach predicts that information technology (IT) will lead to increased use of electronic markets to coordinate economic transactions from electronic hierarchies. However, there is contradictory evidence in the literature regarding the rise and importance of cooperative relationships, joint ventures, and value-added partnerships integrated through information systems. To reconcile these contradictions, this paper analyzes the effect of IT on governance structures based on the TCE, social network theory, and the resource based view (RBV) of the firm. The most important aspect of this paper is that instead of overemphasizing the economic perspective, as has been done in prior IS research, it pays equal attention to economic, social, and knowledge perspectives of the firm. By considering variables such as product demand uncertainty, human specificity, task complexity, and frequency of interaction, the effect of IT on governance structure has been analyzed. In this paper, we suggest that, in knowledge intensive companies, a greater degree of outsourcing will take place, not through markets as hypothesized by earlier researchers, but through an increasing number of social networks. This differentiation can not be understood in simple economic terms because social networks are not based on contracts. Therefore, we suggest that the integration of IT-enabled social networks with the TCE and RBV of the firm leads to a better understanding and improvement of decision-making and corporate governance structures in knowledge intensive firms.*

## **INTRODUCTION**

Information systems (IS) research has mostly focused on transaction cost economics (TCE) to predict the effect of information technology (IT) on governance structures. The term 'governance' in general refers to the systems by which an organization or society operates; however, business scholars have mostly paid attention to markets and hierarchies. Due to its theoretical foundation and empirical support, TCE based approach has been of enormous importance in explaining the basis for the existence of firms and markets (Foss 1996). The basic questions in TCE are: Why do firms exist? How are their boundaries determined?

Since Ciborra (1993) postulated that information technology (IT) reduces transaction cost, resulting in more efficient markets and hierarchies, there has been an enthusiastic response from researchers in applying TCE logic for interpreting the effect of IT on governance structures. Malone et al. (1987) argued that IT reduces the unit cost of transaction, resulting in the emergence of electronic markets. Clemons and Row (1991) and Clemons et al. (1993) extended the above themes by incorporating transaction risk into transaction cost and showed that IT can lower the transaction cost without increasing the transaction risks, which leads to a greater degree of outsourcing and more cooperation between a fewer number of partners. Gurbaxani and Whang (1991) integrated TCE and agency cost

thesis. Their arguments were inconclusive for the emergence of markets or hierarchies. Bakos and Brynjolfsson (1993) argued that relationships between suppliers and firms require that suppliers invest in transaction specific assets, but because these investments are non-contractible and specific to a relationship, suppliers may not be in a bargaining position. By reducing the number of suppliers, a firm can maintain a tighter relationship and convince them that the returns on their investments will not be "expropriated in *ex post* bargaining."

TCE based analysis predicts that information technology (IT) will lead to more use of electronic markets to coordinate economic transactions from electronic hierarchies. However, there is evidence in the literature that indicates an increase in the importance of strategic social networks, cooperative relationships, joint ventures for R & D, value-added partnerships, virtual organizations, and logistics, integrated through common information systems (Piore and Sabal 1984, Powell 1990, Amit and Zott, 2001). Factors impacting the role of IT on governance structures include trust, reputation, and innovation in TCE. Social networks and social capital in an IT perspectives are gradually emerging (Kumar et al. 1998, Huysman and Wulf 2004). This paper, therefore, undertakes the goal of integrating the social perspective, the resource-based view (RBV) of the firm, and TCE to analyze the effect of IT on governance structures. The most important aspect of this theory is that instead of over-emphasizing the economic perspective, it pays equal attention to social embeddedness in economic exchange (Granovetter 1992) and the knowledge-based perspective of the firm (Mahoney and Pandian 1992). Recent examples include open-source software development process that is initiated by volunteer programmers dispersed worldwide. These programmers are heavily dependent on electronic media, yet work as members of several social networks (Scacchi 2004). Thus, in this paper, we analyze the effect of IT on governance structures and argue that a greater degree of outsourcing will take place, but not through markets as hypothesized by earlier researchers. Instead, exchanges increasingly will be conducted through social networks and will not be based on contracts.

This paper makes three contributions to the IS field. First, it shifts the focus of IS research from transaction cost economics toward a realistic approach in which firms' exchanges are considered socially embedded. It also attempts to integrate IT enabled social networks with the economic perspective of organizations and the RBV of organizations. Since TCE theory has been widely criticized because of its over-reliance on the economic perspective at the expense of social norms and relations (Ghosal and Moran 1996), this is an important line of inquiry. Second, this paper examines the dynamic aspects of IT to find its effect on governance conditions with particular emphasis on knowledge based firms. The prior research has taken a static view of IT and does not account for the changes in organizational tasks, human expertise, and organizational structures as a result of IT. We argue that with the introduction of IT, a firm often reorganizes its tasks and structures, which, in turn, cause shifts in organizational knowledge and managerial capabilities. Third, this paper suggests that knowledge-intensive firms are more likely to enter into collaborative structures because of their inherent need to learn and strengthen their complementary capabilities (Kogut and Zander 1992). For these firms, the motivation is not only to reduce transaction costs, but also to satisfy their inherent drive to process and share complementary knowledge across social networks. The rest of the paper is organized as follows. First, we briefly describe transaction cost economics, social networks, resource-based perspective of the firm, and the information intensity of the firm. Second, we discuss the characteristics of information technology (IT) and its effects on different governance conditions. Next, we describe the governance conditions under which participant firms are likely to enter into social networks for coordinating their exchanges, instead of markets and hierarchies. Finally, we briefly outline the implications and conclusions of our study.

### TRANSACTION COST ECONOMICS (TCE)

TCE is a comparative efficiency framework for selecting alternative governance structures (Williamson 1994). Earlier work within the TCE framework has shown that relational contracting is the basis of an alternative governance structure between markets or hierarchies (Rockart and Short 1997). Traditionally, TCE has mostly distinguished between two kinds of sourcing: markets and hierarchies (Coase 1937, Williamson 1975). Markets govern external exchanges through price mechanisms and legal contracting, and hierarchies govern the firm's internal exchanges through direct employment and asset ownership (Powell 1990, Williamson 1975).

Exchanges conducted through markets are considered to provide advantages in production cost, as a market usually takes the benefit of the economies of scale in production. However, exchanges conducted through markets incur considerable transaction costs in searching for the right supplier, writing and negotiating the contract, monitoring and enforcing the contract, and coordinating with the supplier for the duration of the project. On the other hand, in

hierarchies, as a result of asset ownership, production cost is substantial while the transaction cost is lower. Under an economic rational perspective, managers choose the governance structure that reduces the total cost of exchanges in production and transactions (Clemons et al. 1993). Because TCE overemphasizes economic perspective at the expense of social relations, TCE has come under severe scrutiny by a number of researchers (Ghosal and Moran 1996, Granovetter 1992, Jones et al. 1997). Granovetter (1992) acknowledges that economic exchanges are deeply embedded in social relations and the efficiency of various coordination structures, such as markets and hierarchies, depends on the social consensus about generally agreed norms and behaviors. Therefore, exchanges conducted both in markets and hierarchies are considered to be supported and shaped by the norms of the social groups involved (Uzzi 1997). Seeing such close connections between economic exchanges and social relations, Jones et al. (1997) suggest that incorporation of social embeddedness into TCE can provide a better understanding of markets and hierarchies as social relations complement and, in some cases, substitute for the existence of markets or hierarchies (Sako 1998).

## **SOCIAL NETWORKS**

A social network governance structure refers to long-term informal social relations between two or more autonomous units, firms and markets to coordinate their exchanges (Miles and Snow 1986, Powell 1990). A social network governance structure is distinct from hierarchies and markets because in network governance, exchanges are conducted between nonhierarchical and legally autonomous units. Exchanges in social networks are conducted not because they are legally bound, but rather because they are bound by social relations (Ring and Van de Ven 1992, Snow et al. 1992). The network governance relies heavily on social coordination and control mechanisms, such as shared norms, cultures, reputations and mutual cooperation, rather than on a hierarchical authority or legal contract (Jones et al. 1997). To respond to markets, organizations are compelled to seek joint alliances and partnerships to maintain market share in the industry because it is impossible for one business alone to accomplish core competencies in all the functions. These joint alliances, partnerships and relationships between organizations are accomplished by establishing inter-organizational systems (IOS) that are initiated through social networks (Kumar and Crook 1999). Collaborations between organizations often require the establishment of communication and information systems between companies (Jones and Feng, 2003). Technologies such as concurrent multi-user authoring systems, computer conferencing, integrated computer/video meeting systems, electronic voting, brainstorming, and workflow systems have been helping organizations to build their social networks that result in strategic alliances or computer mediated collaboration (Pendergast and Stephen 1999).

Developments in network technology have enabled an increasing variety of interorganizational relationships that support electronic markets or customer/supplier relations (Volkoff et al 1999). It has been argued persuasively that social networks hold relevance for economic action. As business firms fail to attain economic objectives or potential exchange partners via market mechanisms, social networks become important to help organizations to influence the efficiency of economic actions (Rangan 2000). Social networks not only help foster strategic alliances, but a personal relationship accelerates learning and increases the effectiveness of alliances (Hurt et al. 2000). Strategic alliances are assuming an increasingly prominent role in the strategy of leading firms, both large and small. Such cooperative relationships can help firms gain new competencies, conserve resources and share risks, move more quickly into new markets, and create attractive options for future investments (Hurt et al. 2000).

Despite the ubiquity and increasing ease of access to vast stores of data, people still rely heavily on other people for information and problem solving. Organizations must realize that people rely more on sets of relationships for buying or selling transactions and thus influence the resource based view (Cross et al 2001). Mistri and Solari (2001) modeled social and economic relations that characterize the industrial district. Their analysis showed that small enterprises linked together by cooperative and competitive relationships in the form of social networks were more productive than those organized otherwise.

Increasingly, various studies have highlighted that IT enabled social networks have effects on turnover (Krackhardt and Porter 1985), power (Brass 1984) and the adoption of innovations (Burkhardt and Brass 1990). Economic relationships between organizations are embedded in networks of social relationships (Granovetter 1985, Uzzi 1997). Many joint ventures, alliances (Miles and Snow 1986, Jones et al. 1997), partnerships, and relationships are a result of inter-organizational networks that begin within a social context (Stevenson et al 2000). Numerous statistical and case studies provide evidence that trans-national business and social networks promote international trade by alleviating problems of contract enforcement and providing information about trading opportunities (Rauch 2001).

## **RESOURCE BASED VIEW (RBV) OF THE FIRM**

From a resource based perspective, organizations are considered heterogeneous in relation to their resources and capabilities. Resources and capabilities largely determine the competitiveness of an organization (Barney 1986, Dierickx and Cool 1989, Peteraf 1993, Prahalad and Hamel 1990, Rumelt 1995, Teece 1987, Teece et al. 1997). In this approach, each organization consists of unique resources and capabilities through which it accrues rents (Barney 1986, Teece et al. 1997). In essence, the central theme of the resource based view is the role of organizations in developing and deploying scarce resource capabilities, which cannot be easily imitated (Wernerfelt 1984, Madhok, 2002). Firms are heterogeneous with respect to their resources, capabilities, and endowments because firms are constrained by their historical past, existing resources, and accumulated capabilities (Diericks and Cool 1989, Mahoney and Pandian 1992). The development of capabilities takes time, and the process of capability development is likely to be affected by existing capabilities and an organization's absorptive capability. Therefore, differences in firms' performances are based on the differences in organizational resources, capabilities, and endowments. Richardson (1972) provided an overview of organizational boundaries based on organizational capabilities. He argued that organizational activities can draw from general capabilities. However, some activities require complementary resources for their coordination. Complementary and similar activities may best be undertaken under hierarchical governance, while access to closely complementary but dissimilar activities is best obtained through social networks.

Since business strategy increasingly focuses on the flow of information between buyers and suppliers, the resource based view of the firm suggests that firms with high IT capability tend to outperform a control sample of firms on a variety of profit and cost-based performance measures (Bharadwaj 2000). Further, Pettus (2001) empirically demonstrated that firms following a specific resource based development path experience more growth than firms that do not follow the development pattern. This indicated that the growth potential of any firm depends upon the resource base it develops in a path-dependent process.

## **INFORMATION INTENSITY OF THE FIRM**

Information intensity of a firm refers to the extent to which its products and services are based on information (Glazer 1991). Even though information is an integral part of any organization, all products and services do not require an equal amount of information to enable them to be developed, produced and used. Information-intensive firms focus on the information value chain. The value chain begins with data collection and structuring it in an appropriate format. The information is then analyzed, interpreted, modeled, and transformed into knowledge. Knowledge is a stock of expertise, not a flow of information. The goal of Information-intensive firms is to capture the value of the information at each point along the chain (Glazer, 1993). For example, the design, production, and assembly of complex products, such as an aircraft, require a tremendous amount of information to coordinate the efforts of many employees working on different components and subassemblies (Gangopadhyay and Huang, 2004). On the other hand, cooking a hamburger at McDonalds requires comparatively far less information. In addition, developing a new information system may require more coordination and communication among managers, system designers, system engineers, and users than the actual manufacturing of a chair or table.

Information intensive environments are typically dynamic and turbulent, thereby imposing greater information processing demands on organizations. Firms facing such environments are characterized by shortening overall product life cycles and/or accelerating product development cycles to allow new products and services to enter markets more rapidly. Thus, their strategies are structured around their abilities to respond to customers' queries quickly and accurately to provide superior customer services (Glazer 1991, Piore and Sabel 1984).

### ***Knowledge Creation and Exchange***

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Knowledge is defined as information combined with experience, context, interpretation, and reflection. Knowledge is information that is action oriented and ready to apply to decisions (Davenport et al., 1998, Nonaka, 1994). Nonaka and Takeuchi (1995) state that knowledge is created, integrated and applied in specific organizational contexts. Nonaka, Konno and Toyama (2001) suggest the theory of continuous self-transcending process of knowledge creation. They think that knowledge is created through interactions among individuals in organizational settings. According to Nonaka and Konno (1998):

*“there are two kinds of knowledge: explicit knowledge and tacit knowledge. Explicit knowledge can be expressed in words and numbers and shared in the form of data, scientific formulae, specifications, manuals, and the like. This kind of knowledge can be readily transmitted between individuals formally and systematically. . . . Tacit knowledge is highly personal and hard to formalize, making it difficult to communicate or share with others. Subjective insights, intuitions, and hunches fall into this category of knowledge. Tacit knowledge is deeply rooted in an individual’s actions and experience as well as in the ideals, values, or emotions he or she embraces.”*

Nonaka and Takeuchi (1995) argue that knowledge creation is a spiraling process in which knowledge is continuously created and re-created within the work team and the organization. Nonaka, Konno and Toyama (2001) suggest four phases of knowledge creation cycle; socialization, externalization, combination and internalization. According to them, the process of knowledge creation begins with socialization, where the project team leaders and individual members will be accumulating tacit information, primarily through informal interactions. During the second phase of externalization, the basic structure of solutions and innovative design knowledge is created and articulated in explicit form. In this phase of knowledge creation, IT is often utilized as a tool to perform analytical, data management, and presentation tasks.

In the next phase of combination, most of the detailed work is carried out, assembling and synthesizing the available knowledge for the purpose of implementing. Explicit knowledge created during the previous phase is transformed into a more organized form in this phase. In the final phase of the knowledge creation cycle, internalization is carried out in order to embody the new knowledge in the organization in form of learning. In this phase, through learning, explicit knowledge is transformed into tacit knowledge. Such tacit knowledge will then be used as the basis upon which further knowledge is developed (Nonaka, Konno and Toyama, 2001).

## **CHARACTERISTICS OF IT**

In interpreting the effect of IT on governance structures, the following characteristics of IT have been widely applied in TCE logic (Clemons et al. 1993, Malone et al. 1987): (1) IT can reduce the cost of processing, distributing, and sharing information. This reduces the cost of coordination; and (2) IT can increase information availability and processing capacity. This facilitates monitoring and controlling the performance of other participants in the relationship.

Nevertheless, in addition to above two characteristics, IT also captures informal communications, personal-experiences, and personal interpretations. This facilitates communication and discussion, leading to collective learning among different organizational members. For example, IT enables organizations to effectively communicate knowledge via electronically mediated channels. With IT, organizations can disseminate explicit, factual, and context specific knowledge within a social community, sharing similar views and objectives. Moreover, when social networks share complementary and partial views of emerging realities, e-mail, discussion databases, and videoconferencing can offer benefits in sharing narrative and tacit knowledge (Zack 1999).

Further, IT facilitates the storing, categorizing, and indexing of knowledge, along with the contexts in which knowledge is created and validated. For example, the World Wide Web, Lotus Notes, and groupware enable organizations to capture and store explicit and rich units of knowledge. A flexible IT structure offers flexible and dynamic views of knowledge structures to make sense of organizational realities through a common schema (Zack 1999).

### ***IT and Exchange Conditions***

Malone et al. (1987) and Clemons et al. (1993) argue that IT substitutes a number of factors and has minimal effect on employee skills (human specificity, learning propensity, and collaboration). On the other hand, other studies suggest that IT has a positive effect on knowledge exchange, knowledge sharing and organizational knowledge (Rockart and Short 1991). For example, Venkatraman (1991: 143-144) states:

“Specialized skills and expertise are shared using an appropriately designed [electronic] business network. The role is characterized by unstructured information sharing and reflects the creation of a virtual intellectual network across physical and organizational boundaries. For example, it is possible to assess and interpret complex data (e.g., technical, managerial, legal, and medical) across different participants in a network before arriving at a final interpretation and conclusion.”

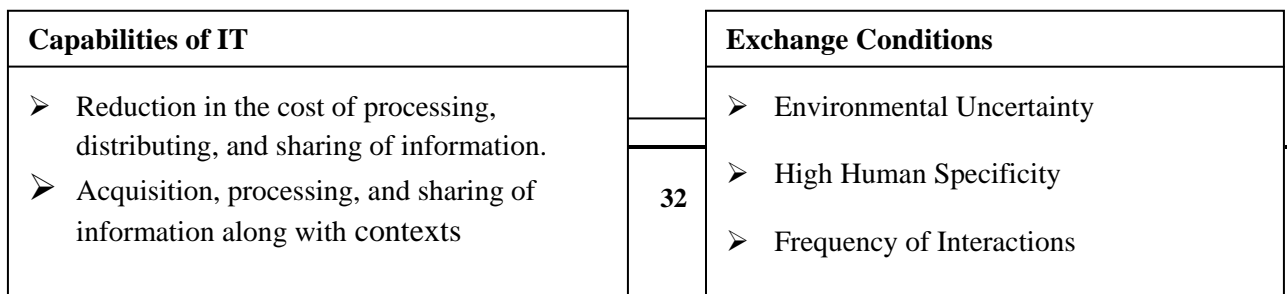
The emphasis is not only on reducing the cost of production, but on increasing the quality and timeliness of new product development and services in a rapidly changing and dynamic environment. While IT can reduce transaction costs and affect the quality of services for complex and unstructured knowledge-based activities, IT cannot be substituted for human skills. IT can be a substitute for human expertise only if organizational activities are structured and standardized in advance. Automatic teller machines (ATMs), electronic data interchange (EDI) interface between suppliers and customers, automated delivery of publicly available documents and information and CD-ROM based training are some examples that illustrate the cases in which a large body of information and knowledge is captured in standardized formats. However, in situations where customers’ needs and expectations for services are unique and where clients require personal attention from their consultants, IT will have very little effect in meeting customers’ demands (Osterman 1991). In these situations, a firm's main motivation will be to draw knowledge from external sources so that it can meet its customers’ demands efficiently, as Grant (1996) argues:

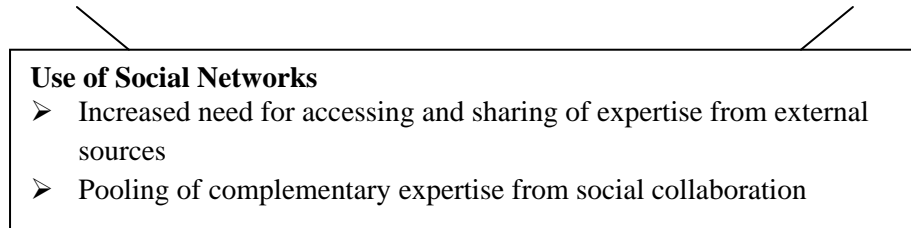
*“If competitive advantage in dynamic market settings is critically dependent upon establishing first-mover advantage then the critical merit of firm networks is in providing speed of access to new knowledge.” (p. 382).*

Therefore, despite the transaction cost advantage that will accrue to firms, many firms will enter into collaborative arrangements for other reasons such as exchanging and sharing of complementary knowledge across their boundaries from external sources to handle clients’ personal demands in several areas. The use of IT will enable mutual coordination by easily capturing, storing, indexing, and sharing complementary knowledge from social networks that is not publicly available. Rockart and Short (1991: 202-203) illustrate the above theme as follows:

*“Networks allow for dynamic multidisciplinary coalitions to form. Authority is derived not through a vertical chain of command but through characteristics of how networks function—in short, through the sharing of work, expertise, decision making, and responsibility.”*

The relationship of IT capabilities and exchange conditions for the knowledge intensive firms is depicted in Figure 1. As a result of collaborative and ongoing learning, the central focus of knowledge intensive firms is toward creation, exchange and integration of knowledge into their products and services. Success of knowledge intensive firms depends upon how they integrate and utilize their distinctive knowledge effectively and synergistically (Starbuck, 1992, Dougherty, 1992; Nonaka, 1994). The overall organizational knowledge base or knowledge network is created through the process of exchange, evaluation and integration of knowledge of individuals with others in the organization (Tenkasi, and Boland, 1998).





**Figure 1: IT and Exchange Conditions for Knowledge Intensive Firm**

Clearly, IT helps firms to effectively and efficiently deal with demand uncertainties. The exchange conditions in the knowledge-based firms generally require a high level of human specificity and an increased frequency of exchange. These are made possible by enhanced IT capabilities, creating favorable conditions for success.

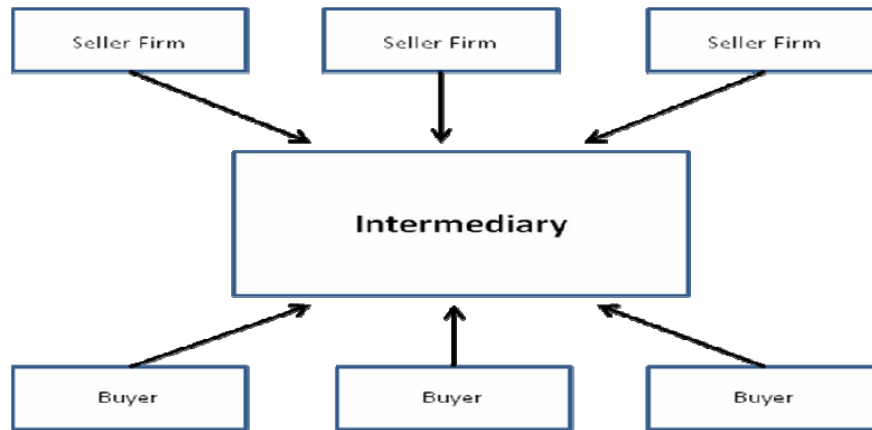
### **IT, MARKETS AND HIERARCHIES**

We now analyze the governance structure from TCE, social relation, and RVB perspectives. Subsequently, we outline the conditions in which social networks are better suited to conduct exchanges than markets or hierarchies. Research in transaction cost theory considers two types of coordination mechanisms for carrying out transactions between buyers and sellers: hierarchies and markets. In an electronic hierarchy, organizations share a long-term relationship and align their internal processes with one another. For example, by using IT, Wal-Mart has integrated its databases with their trusted suppliers. Due to this integration through IT, purchasing and distribution are accomplished within and between firms in a seamless fashion. An electronic hierarchy enables the efficient exchange of information among its components.

Electronic hierarchies are critical in maintaining product differentiation and asset specificity (Lewis, 2001). Through integrated supply chains across the firms, organizations can improve the coordination of hierarchical business relationships that in turn can result in better product or service quality. On the other hand, electronic markets occupy a relatively neutral position between buyers and sellers, providing services to both sides of a transaction. Electronic markets also facilitate transactions by supporting arrangements for logistics (including order fulfillment and delivery), account management and, in some cases, providing trust or insurance to guarantee commitments made by buyers or sellers.

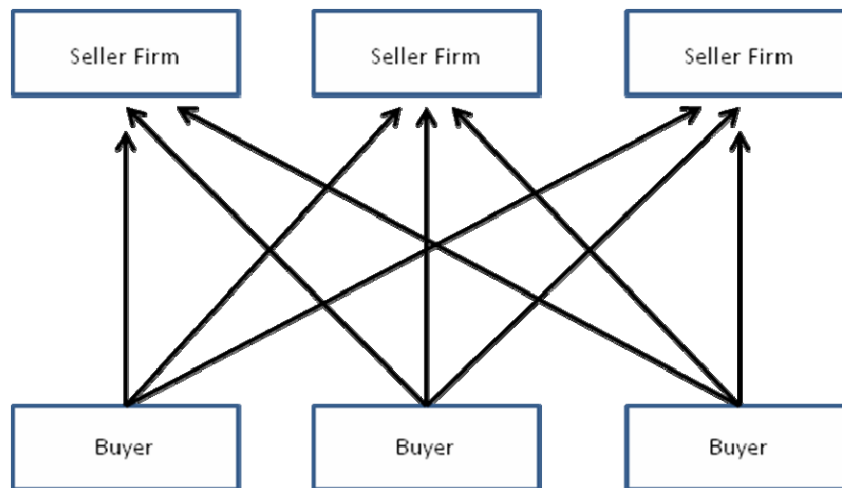
Electronic markets are either centralized or decentralized. Centralized electronic markets are characterized as a one-stop shop. Centralized markets use one or more intermediaries such as brokers or distributors and buyers and sellers need only to connect to one or more of these intermediaries to carry out transactions. Examples of such electronic markets include priceline.com, ebay.com, autotrader.com, autoexchange.com, Edmunds.com, and yahoo.com. In centralized markets, the role of intermediary is very important as shown in Figure 2. Intermediaries add value to supply chains by reducing the cost of bringing a product to market, through actions such as aggregating buyer demand or seller production to achieve economies of scale, protecting buyers or sellers from opportunistic behavior, and matching buyers and sellers.





**Figure 2: Centralized Electronic Markets.**

In a decentralized market, buyers can contact the sellers directly, and no intermediary is involved in the transactions as shown in Figure 3. For example, a buyer can buy a ticket from United Airlines by directly contacting them online rather than going through an intermediary such as yahoo.com, etc.



**Figure 3: Decentralized Electronic Markets.**

We now examine the third attribute of the governance structure that we refer to as social networks. Social networks are different from hierarchies as well as markets, since social networks work based on personal acquaintance, and mutual understanding, where trust play an important supporting role (Lewis 2000). Moreover, networks do not work on the basis of the contract nor do they work on the basis of the price mechanism. Below we outline the conditions under which IT will lead to more use of social networks rather than hierarchies or electronic markets (Williamson 1985, 1994). Below we evaluate three exchange conditions: environmental uncertainty with a stable supply, customized exchanges high in human asset specificity, and frequent exchange among parties--in examining how the interaction of IT capabilities, and information intensity, and knowledge creation and sharing can lead to social networks and cooperative arrangements among firms.

### ***Environmental Uncertainty with a Stable Supply***

Environmental uncertainty occurs because it is hard to foresee all the eventualities that might occur during the course of the transaction. The source of this environmental uncertainty can arise from suppliers, customers, competitors, regulatory agencies, unions or financial markets (Miles and Snow 1986). The important factor here is the length of time over which the transaction takes place. For example, an exchange conducted in the spot market involves very little uncertainty because one does not need to predict the future. On the other hand, transactions requiring considerable completion time always involve some uncertainty. Uncertainty raises the question of bounded rationality as well as opportunism.

Based on TCE, research on environmental uncertainty has shown firms conduct their exchanges hierarchically (Williamson 1985, 1994). However, uncertainty in customer demands makes vertical integration for firms risky because of obsolescence of the products and services (Saxenian 1990). Under demand uncertainty, the heavy emphasis toward rapid transfer of specialized skills and knowledge to meet customers' unpredictable demands will cause firms to enter into long-term social relations and learn from each other. IT can reduce the constraints of space and time, allowing different parties to work in collaboration to easily exchange and share knowledge around the globe. IT has the advantage of reducing coordination costs; however, coordination cost is only a facet of the total cost. Production cost is equally important, because all the firms do not possess equal expertise and human skills in production, as Conner (1991) states:

*“Transaction cost theory assumes that the same productive activity can be carried on either within a firm or by a collection of autonomous contractors; that is, except for problems of opportunism, the same inputs can be used equally productively in a firm or market context” (P. 142).*

A similar view based on Demsetz (1988), is taken by Foss (1996) in stating:

*“One problem in the contractual approach is that it is often implicitly assumed that what one firm can do on the level of production, another firm can do equally well, so that differences in economic organization are not allowed to turn on differences in production costs” (p. 474).*

In fact, the RBV of the firm dictates that firms are heterogeneous bundles of resources and possess different production capabilities. Therefore, when a product or service requires disparate pieces of expertise, the firm is more likely to get this knowledge through collaboration. Developing and nurturing expertise takes several years before it can be used for commercialization purposes. So, the easier route for the firms will be to share complementary resources among participants in social networks to meet customers' dynamic and unique demands quickly. For example, highly information intensive firms, such as Microsoft and IBM, have entered into collaborative arrangements with several universities across the world. Because industries and universities possess different cultures and different kinds of knowledge (human specificity) in basic and applied research, collaboration between them is becoming commonplace through leveraging the use of high powered computers and communication technologies. Even in a developing country like India, IBM, Microsoft and other software companies have entered into a number of alliances with several universities to develop new software products.

IT is likely to play a larger role in the development of social networks when demand uncertainty is likely to cause dramatic shifts in knowledge development. The sudden shifts in knowledge development cannot be specified through market contracts nor coordinated within the hierarchy, because of high investment and risks. However, by quickly acquiring and processing information through social networks, IT can enable firms to coordinate their complementary knowledge with new market realities. Because a hierarchy is often closed to changing market realities and the market is unreliable for offering concrete knowledge, a social network can bring fresh perspectives as it is open to complementary and novel reconfiguration of complementary knowledge to adjust to changing realities (Lehman-Anderson, et al. 2004). Therefore, we argue that many firms will use IT for pooling complementary expertise and sharing risks of demand uncertainty. Thus, in information intensive industries, where demands are often changing and new variants of products are increasingly appearing, firms are likely to coordinate their resources through social networks in which IT will play a vital role in pooling complementary knowledge and sharing risks. Grant (1996) states this theme as follows:

*“Interfirm collaboration can increase the efficiency with which specialized knowledge is utilized. A consequence of hypercompetition is uncertainty over links between knowledge inputs and product outputs. In biotechnology, new knowledge may have applications in ‘human health, crop production and protection, chemical feedstock production and processing, food processing, and waste management’ (Liebeskind et al. 1996). As a result, ‘these sources of technological and competitive uncertainty make it extremely difficult to determine which scientific knowledge is potentially valuable and which is not . . .’ (P. 383)*

### ***Customized Exchanges High in Human Asset Specificity***

Commodity-like products that are easy to describe and adapt easily to market-like transactions tend to be characterized by lower profit margins. In such cases, electronic hierarchies are critical for maintaining product differentiation and asset specificity. Organizations are developing strategic alliances and implementing their Inter-Organizational Systems (IOS) that increase the level of asset specificity, either as part of an explicit strategy to secure customers or as a result of improving the coordination of hierarchical business relationships. This is validated by the emergence of integrated supply chains and a reduction in the number of suppliers in many manufacturing companies (Lewis 2001).

Customized exchanges usually create dependency between participants. For example, if a buyer decides not to be a participant in transaction specific exchanges, in post-bargaining the seller cannot sell or transfer the product or service easily to other firms (Williamson 1985). The customization of products and services increases the need for coordination between parties and raises the concern about safeguarding these exchanges without making other parties vulnerable due to post-bargaining negotiations.

A TCE based analysis predicts that highly specific products or services are more likely to be acquired through hierarchies than through markets because customized exchanges require close coordination and adjustment and make other parties vulnerable in post-bargaining. Involved participants may be required to make several adjustments due to market shifts and demand changes, which are difficult to specify precisely in the contract negotiation. In general, customized exchanges are asset-specific. Asset specificity can occur in technology, service, site, or knowledge. Williamson (1985) has shown that highly asset-specific transactions are usually conducted through hierarchies rather than markets.

Malone et al. (1987) convincingly argued that IT can reduce investments in physical and time specific resources to produce more standardization and to lead firms towards markets. We concur with their arguments concerning the impact of IT on asset specificity (Lea, 2005). However, we disagree in the case of the human specificity, which is a more important attribute of information intensive firms, especially when organizational activities are highly unstructured. As we argued earlier for unstructured activities, IT is a poor substitute for human expertise. On the contrary, unstructured organizational activities will put a premium on human expertise, demanding a higher level of human specificity (Rockart and Short 1991). For example, increasing use of CASE (computer-aided software engineering) tools in software development has not decreased the level of human expertise required in developing new systems. There has been an increasing pressure on software developers to bring new and sophisticated software to the market more rapidly. Because firms require time and effort to develop new knowledge and capabilities and are constrained by their historical past, information intensive firms are more likely to enter into social networks to share and deploy complementary knowledge of their products and services. Grant (1996) explains this as follows:

*“A final consideration concerns the speed with which new capabilities can be built and extended. Even if relational contracts are imperfect vehicles for integrating knowledge, a critical concern is that they can permit knowledge to be transferred and integrated with a comparatively short time.” (P. 384).*

Because of its capabilities in acquiring, manipulating, and sharing vast amount of information and context specific knowledge, IT will enable an increased use of social networks, as context specific information and knowledge cannot be acquired from the market. Therefore, many of the asset specific tasks (which require high level human expertise), as conceived by Malone et al. (1987) to be conducted through markets will rather be arranged through social network governance structures. IT will enable social networks to thrive by enhancing knowledge sharing and coordination between participants (Tapscott and Williams 2006).

In knowledge intensive firms, hierarchies are of limited usefulness since in the long run, if organizations do not replenish their knowledge bases, a large part of knowledge is likely to become obsolete (Quinn 1999). In situations where human specificity is high, collaborative structures between two or more firms are likely to offer an unbiased view of each others' complementary capabilities. This kind of critique often keeps firms abreast of the latest knowledge developments in their disciplines. Similarly, use of markets is limited since markets are unable to provide authenticated and reliable knowledge quickly. We therefore argue that, for knowledge intensive firms, collaborative structures are most successful, because knowledge exchange and sharing are likely to open more opportunities for further collaboration in the future, which can enhance trust and cooperation between parties. For example, the development and use of an electronic web-site can enhance trust level among social participants (Monge et al. 1998). Legal contracts are not possible since the nature of expertise and knowledge required to perform unstructured tasks is not known in advance.

Liebeskind et al. (1996) and Smith and Zeithaml (1996) have confirmed the importance of knowledge intensive transactions through social networks in the biotechnology and the telecommunication industries respectively. The use of shared databases can provide quick and easy access to network participants (Fedorowicz, et al. 2004). The use of this private information and knowledge is important for firms not only in bringing new products and services in the market, but also in aligning different participants toward a shared goal (Monge et al. 1998). On the other hand, in the fashion apparel industry, where the requirement for drawing new knowledge from external sources was not highly profound, social networks were not as beneficial as hierarchies (Richardson 1996).

### ***Frequent Exchange Among Parties***

Although Williamson (1985) identifies frequent exchange between participants as an important determinant of governance, it has not received much attention. Frequency of interactions allows human expertise to develop from "learning-by-doing" to enhance the transfer of the tacit knowledge among parties. In order to be a part of a social network, an organization must develop and maintain core competency in an area and establish flexible, compatible, and integrated electronic networks with the suppliers' and the customers' databases to capture and systematically use state-of-the-art knowledge (Quinn 1999).

The effect of IT on frequency of exchange will depend on the features of the transactions. If transactions to be conducted are standardized and routine, we believe IT will reduce the frequency of interaction between parties, as more information can be processed and exchanged per time-unit. This causes many standard exchanges to be conducted through markets. On the other hand, we argue that to perform complex and unstructured knowledge specific tasks, IT will facilitate the frequency of interaction. For example, since the proliferation of the Internet and groupware in industries and educational institutions, several industries and academic institutions have entered into collaborative arrangements across the world to share and distribute the results of their experiments and data analysis.

Over time, we expect that a majority of information intensive transactions will be conducted through social networks rather than markets or hierarchies. This is due to the high cost involved in monitoring information reliability in markets and the ability to learn new capabilities in a hierarchy. For example, MLP, a network of about 900 legally independent financial advisers, led by MLP-Finanzdienstleistungen AG, Heidelberg is an example of a social network that offers financial services to private high-income customers. It maintains relations with banks, insurance companies, and other brokers through information technology (Sydow and Windeler 1998). The firms in the network are strongly involved in knowledge sharing as well as collectively understanding and interpreting knowledge in similar schema while working on a common organizational goal of doing financial business with high-income customers (Christiansen and Venkatraman, 2002, Sydow et al. 1995).

Moreover, when collaborative parties are working with complex and unstructured knowledge-based activities, which require specialized and complementary skills, legal contracts will be of little use because of several unforeseen circumstances, the tacit nature of expertise, and the uncertainty of the outcome. However, IT can facilitate the emergence of social networks as it increases the interactions between firms by processing, manipulating, and exchanging increasing amount of complementary knowledge. SEMATECH alliance within the semiconductor industry is an example. The main goal of the alliance was to improve industry infrastructure at the national level to counter foreign competition (Browning et al. 1995).

Zack (1999) argues that complex knowledge intensive exchanges require multiple knowledge structures, repositories, and interactivity between different social actors to continually create, refine, and store new knowledge. In this respect, IT will not only expedite the process of renewing knowledge sources but also captures the contexts and processes in which specific knowledge is created and validated. Knowledge integration across different contexts entails new insights between social networks in creating a collective schema of organizational problems and their solutions through socially shared knowledge.

## IMPLICATIONS

This paper offers an explanation of the effect of IT on governance structures, based on the integration of TCE, social networks, and the RBV of the firm. The major shortcoming of TCE in relation to knowledge intensive firms is that TCE does not explicitly examine the role of intangible resources (assets) in governance structures, except analyzing them as a function of coordination costs. Also, TCE does not adequately consider social relations, which often bind individuals for long-term exchanges. Moreover, TCE has been overly focused on “ownership,” while in knowledge intensive firms, knowledge is usually owned by the employees rather than the firm. Finally, in knowledge intensive firms, “knowing” is considered as an emergent and interactive property of the firm (Raelin 1997), which cannot be easily purchased from the market or produced within the hierarchy.

When a firm works in high velocity environment that requires disparate pieces of expertise from external sources, IT becomes an enabler for creating social networks to meet customers’ dynamic and unique demands quickly (Christiansen and Venkatraman 2002). The effect of IT in building social networks become more significant in the following three exchange condition: (1) the firm works in a volatile environment where the demand of its products and services is highly uncertain; (2) the firm works in a high information intensive environment, which demands quick access to new knowledge from the market and subsequently sharing it among the organizational units for bringing new products and service to meet the customer demands; and (3) the firm is required to perform complex and unstructured knowledge specific tasks.

The consideration of IT as an enabler of social networks becomes critical since all firms do not possess equal production expertise. Therefore, IT can help reduce coordination cost. However, when the issue of production expertise becomes prominent, firms are likely to enter into alliances with other firms that possess the requisite expertise in the production. Moreover, when knowledge and expertise is tacit or sticky, firms prefer to use IT for sharing knowledge.

It is pertinent to argue that not all the social networks emerge or thrive because of IT. While IT certainly has the potential to influence social networks, IT alone may not play a critical role (Meyer and Zack 1996). For sustaining the advantages of IT in social networks, simultaneous or interactive changes in organizational processes, structures, and culture are required (Davenport et al. 1998). Zack (1999) states that “[d]oing this in a coherent manner requires aligning a firm's organizational and technical resources and capabilities with its knowledge strategy” (p. 45). Other changes have been well described in IT literature under the rubric of business process transformation, total quality management, and information systems strategy.

We understand the vulnerability of social networks, many of which are often restored only through trust, mutual cooperation, and face-to-face communication (e.g., Davenport et al. 1988). However, discussion of these points is beyond the scope of this paper. The main purpose of this paper is to show that while the strategic management and organizational literature is moving away from a rational and purely economics based view of transactions, IT lags far behind in incorporating the RBV of the firms and social embeddedness into the description of exchanges. By providing a basic framework for the impact of IT in different social exchange situations, we propose to direct research from a TCE based analysis to an integration of IT enabled social networks with the TCE and the RBV of the firm as is currently being pursued in other disciplines.

## CONCLUSIONS

In this paper, we have discussed the effect of IT on governance structure. Rather than taking a purely economic perspective, we have paid equal attention to social, economic, and resource-based perspectives. Thus, we have argued that in information/knowledge intensive firms, IT will favor social networks over markets and hierarchies. IT enables firms to exchange and share complementary knowledge. When customers' demands are unique, markets tend to be unreliable sources of knowledge, and hierarchies tend to be unresponsive and immune to new knowledge. Therefore, in performing complex and unstructured knowledge-based activities, social networks provide the advantage of exchanging and sharing complementary knowledge. Because economic exchanges are socially embedded, we argued that social networks improve collaboration by increasing the coordination and collective decision-making.

There are many ways IT can safeguard transactions conducted through social networks. IT can increase the frequency of interactions, enhance the shared culture and norms, and allow work in specialized codes and language, regardless of regional and national boundaries. Moreover, IT enables firms to open new channels of communication, which in turn may create new links for the emergence of social networks.

TCE theorists argue that variants of markets and hierarchies exist and propose to subsume these variants under markets or hierarchies. However, we suggest that social networks are not hybrids of markets and hierarchies. Rather, they are based on informal long-term relationships, which are socially binding. Since the ability of buyers and sellers to interconnect each other for transaction exchange is central to markets, social networks are framed around informal patterns of communication and interaction with a few selected members. Therefore, integration of IT enables social networks with the TCE and RBV of the firm may lead to a better understanding and improvement of decision-making and corporate governance structures in knowledge intensive firms.

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