

**BOUNDARIES AND KNOWLEDGE CONTRIBUTION IN  
INTERORGANIZATIONAL RELATIONSHIPS: A SOCIAL  
CAPITAL PERSPECTIVE**

**Carmen C. Lewis**

Florida State University  
College of Business  
Tallahassee, FL 32306-1110  
Telephone: 850- 644-7895  
ccs05f@fsu.edu

**Ashley A. Bush**

Florida State University  
College of Business  
Tallahassee, Florida 32306-1110  
Telephone: 850-644-2779  
abush@fsu.edu

## Abstract

*Recent work on the social nature of transferring knowledge has identified knowledge sharing as a complex process, going beyond the simple relocation of bundles of knowledge. This increase in the number of knowledge sharing studies has also led to new insights regarding boundaries; however, more questions have been left opened than answered. Particularly, we know little about the role boundary conditions play in assisting information technology with knowledge sharing. We propose a framework for understanding the role communal boundaries play in information sharing between organizations. In essence, because of the social nature of information sharing, the topic of boundaries will be reexamined from a social capital perspective. We develop a theoretical model to examine the moderating effect of boundary conditions on the relationship between IT-facilitated social capital and knowledge contribution. We define a set of testable propositions based on our model to further our understanding of how organizations can facilitate knowledge sharing across organizational boundaries.*

Keywords: knowledge management, interorganizational systems, social capital

## **Introduction**

With the development of information systems focused around sharing knowledge, many scholars have devoted more attention to interorganizational knowledge sharing. Recent work on the social nature of transferring knowledge has identified knowledge sharing as a complex process, going beyond the simple relocation of bundles of knowledge (Boland et al. 1995; Engestrom 1999; Osterlund et al. 2005). This increase in the number of knowledge sharing studies has also led to new insights regarding boundaries; however, more questions have been left opened than answered (Osterlund et al. 2005). Particularly, little is known regarding the role boundary conditions play in assisting information technology with knowledge sharing. We propose a framework for understanding the role communal boundaries play in information sharing between organizations. In essence, because of the social nature of information sharing, the topic of boundaries will be reexamined from a social capital perspective. Specifically, the following research question is posited: *How do boundary conditions affect knowledge contribution through IT-facilitated social capital?*

An additional purpose of this research is to further the study of interorganizational knowledge sharing by suggesting the usage of a newer, and primarily unused data analysis technique, hierarchical linear modeling. The majority of prior work on interorganizational systems has focused on the firm level of analyses (Klein Palmer and Conn 2000), while very few studies have been conducted from a multilevel perspective. Specifically, this paper posits four factors relating to social capital as determinants of knowledge contribution, with boundary conditions moderating the relationship.

The rest of this paper is presented as follows: First, the theoretical framework used in this paper is described. The development of propositions relating to knowledge contribution is then presented, followed by a discussion of the relationship between boundary conditions and knowledge contribution. The expected contributions are then described, and the paper concludes with implications for future research.

## **Theoretical Framework**

Our theoretical framework is built on three complementary perspectives: knowledge-based theory and the role of knowledge in organizations, boundaries and boundary conditions, and social capital theory.

### ***Knowledge***

Fundamental to this research is the assumption proposed by Grant (1996) that knowledge is the principal productive resource of an organization, which is a vital part of knowledge-based theory of organizational capability. In attempting to

explain the theory, Grant (1996, p. 375) acknowledged that, “If the most important resource of the firm is knowledge, and if knowledge resides in specialized form among individual organization members, then the essence of organizational capability is the integration of individuals’ specialized knowledge.” Furthermore, the theory posits that organizational knowledge can create capabilities, which can be used to establish a competitive advantage in dynamic markets (Grant 1996).

In this paper, we define knowledge contribution as the extent to which individuals contribute new knowledge to an interorganizational system (IOS). Applying the premise of knowledge-based theory to knowledge contribution, organizational members possess both tacit and explicit specialized knowledge that can be shared and integrated within and between organizations to form capabilities that can serve as competitive advantages. However, three conditions must be met in order to create a sustained competitive advantage for a firm: the capability must be valuable, heterogeneously distributed across competing firms, and imperfectly mobile (Mata Fuerst and Barney 1995). Although our primary focus is on knowledge contribution between organizations, which occurs at interorganizational boundaries, it is also worthwhile to look at how knowledge is exchanged at boundaries within an organization.

### ***Boundaries***

Boundaries, in the context of this paper, refer to areas where knowledge is exchanged. The knowledge can originate from either a single individual or a group of individuals. For example, knowledge boundaries can arise within an organization at the place individuals exchange knowledge, or they can occur between organizations where groups of people exchange knowledge. Recent work on boundaries has differentiated between boundary spanning and boundary objects (Levina and Vaast 2005). Boundary spanners are individuals who serve to facilitate the sharing of knowledge across both inter- and intra- organizational boundaries. IT professionals are among those responsible for fulfilling these duties (Pawlowski and Robey 2004). The term boundary object refers to a broad range of items that “are plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites” (Star and Griesemer 1989). Such artifacts include IT-based boundary objects, such as enterprise resource planning systems (ERPs) and document archives (Pawlowski et al. 2004).

Only recently have researchers devoted their attention to the types of boundaries that can exist for exchanging knowledge. (Carlile 2004) examined managing knowledge across boundaries, and established that to effectively manage knowledge, different processes are required for different types of boundaries. He integrated three approaches to managing boundaries into a single framework: transferring knowledge, translating knowledge, and transforming knowledge. Knowledge transfer describes the simplest movement of knowledge between organizations (Argote 1999; Szulanski 1996;

Winter 1987). Stemming from traditional organization theory, “transfer” refers to information processing approaches to boundaries (Galbraith 1973; Lawrence and Lorsch 1967), such as storage and retrieval. However, when novelty arises, simple transfer can become problematic. This often occurs when there is a lack of shared common knowledge between the parties to allow assessment of domain-specific knowledge (Carlile 2004). Thus, the need arises for translation of the knowledge.

The second approach to managing boundaries proposed by (Carlile 2004) is knowledge translation, which occurs at a semantic or interpretative boundary. Novelty occurs at this boundary when individuals interpret various meanings for the same object because of a lack of common vocabulary and shared meanings. (Nonaka 1994) addressed this issue in his discussion of the challenges of translating tacit to explicit knowledge. Many methods of enabling knowledge translation have been suggested including: the use of cross-functional teams (Ancona and Caldwell 1992), collocation (Carlile 2004), and participation in similar activities (Orr 1996).

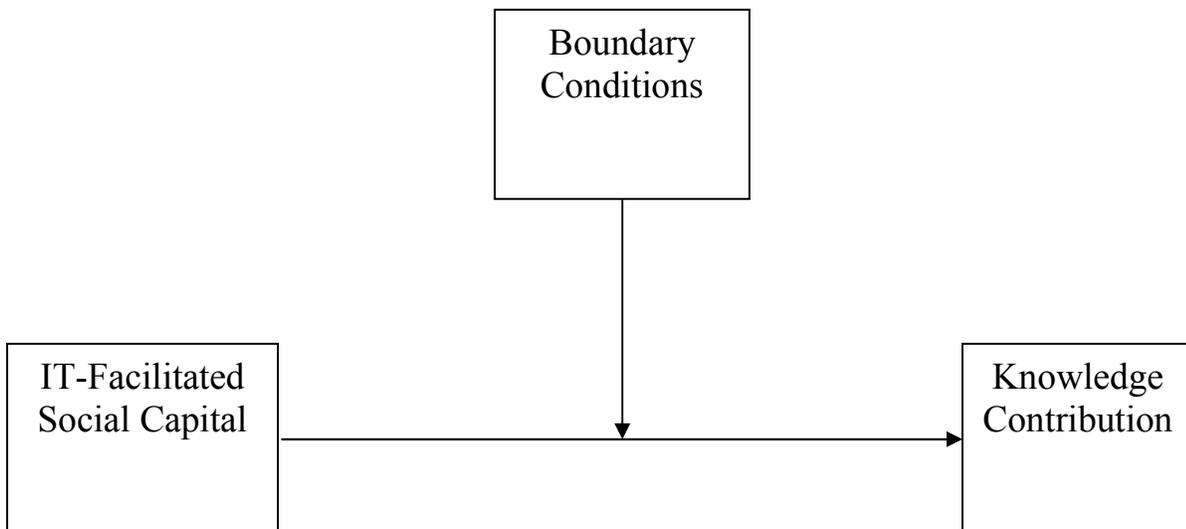
The third type of boundary proposed by (Carlile 2004) is the pragmatic boundary of knowledge transformation, which occurs when novelty levels increase beyond which translation can mend because different interests among individuals arise and have to be resolved. Particularly, pragmatic differences occur when “the knowledge developed in one domain generates negative consequences in another” (Carlile 2004). Costs in the form of investments in the time it takes, along with the process of learning about new knowledge, often lead to individuals being opposed to transforming knowledge. At this boundary, individuals must be able to convey novel forms of knowledge, understand their consequences, and transform it when necessary (Carlile 2004). Boundary objects (Star et al. 1989) can be used to help facilitate this process. IT-based boundary objects, which are the focus of this study, allow information to flow between the various parties, facilitating negotiation and transformation.

The objective of the (Carlile 2004) study was the development and use of a tool with a three-dimensional modeling capability, used to help ease communication problems between members in an organization. Among his results, he found the modeling tool to be effective in disseminating information between groups when novelty was low; however, “[f]ailure occurred when the actors involved did not have the sufficient capacity or ability to manage the novelty that was present” (Carlile 2004). These findings stress the importance of understanding and developing new ways of rectifying novelty through the use of boundary objects.

### **IT-Facilitated Social Capital**

Social capital theory is used to better understand how organizations act as knowledge systems. Specifically, it suggests, “networks of relationships constitute a valuable resource for the conduct of social affairs, providing their members with collectively-owned capital” (Nahapiet and Ghoshal 1998). Therefore, social capital influences the conditions for exchanges to occur, thus contributing to the development of intellectual capital. **In an IOS, information technology becomes a key mechanism for conveying social capital.**

There are three dimensions of social capital: structural, cognitive, and relational. The structural dimension consists of network ties and configuration (Nahapiet et al. 1998). In a network, individuals can have weak ties or strong ties. Weak ties, which are often provided by acquaintances and distant friends, present access to unique information (Granovetter 1972). The cognitive dimension is the second dimension of social capital, which is made up of shared language, codes, and narratives. Trust, norms, obligations, and identification make up the relational dimension. **In this study, we focus only on the relational dimension of social capital as a predictor of knowledge contribution because its factors (trust, norms, obligations, and identification) have been suggested to help open up access to individuals for knowledge exchange to occur (Nahapiet & Ghoshal, 1998).** Hence, building on social capital theory, a framework is developed (Figure 1) that suggests varying levels of novelty in organizational boundaries moderate the relationship between IT-facilitated social capital and knowledge contribution.



**Figure 1. Theoretical Model**

## Propositions

In this section, we develop constructs and propositions based on our proposed theoretical framework and complementary perspectives of IT-facilitated social capital, boundaries, and knowledge. Table 1 summarizes the constructs in the model.

### *IT-Facilitated Social Capital*

#### **Obligations**

Obligations refer to a commitment or duty that binds one to courses of action (Nahapiet et al. 1998). In the context of knowledge contribution, it is suggested that obligations are likely to motivate individuals within and between organizations to contribute and exchange knowledge. Individuals who have received valuable information from others through an IOS will feel obligated to, in return, provide useful information when a question arises concerning a familiar subject. This reciprocity helps to encourage knowledge sharing in the IOS by creating a sense of responsibility to help others.

*Proposition 1: There will be a positive relationship between obligations and knowledge contribution.*

#### **Norms**

Norms occur when actions are controlled not by the individual but by others, constituting a powerful form of social capital (Coleman 1990). Norms can motivate individuals to engage in knowledge exchange (Putnam 1995) by outlining guidelines, rules, or expectations for appropriate behavior and participation. In an organizational setting, certain rules and procedures are established that are made known when an individual is hired and are reinforced throughout one's career.

It is often through collective sanctions that norms increase the likelihood of knowledge contribution to an IOS. Collective sanctions involve punishing others who violate norms, values, or goals, ranging from gossip to ostracism (Jones Hesterly and Borgatti 1997). Therefore, organizations will guard against misbehavior by making the consequences known. So, the norm is to punish wrongdoers. Thus, more established norms help to further deter misbehavior and increase knowledge contribution to the IOS.

*Proposition 2: There will be a positive relationship between norms and knowledge contribution.*

## **Trust**

(Dyer and Chu 2003) examine the role of trustworthiness in automotive supplier-buyer exchange relationships. They define trust as “one party’s confidence that the other party in the exchange relationship will not exploit its vulnerabilities” (p. 58). In their study, a relationship between trust and information sharing is discovered; however, they suggest that future research is needed to test the “causal relationship between trust and information sharing by examining how a change in trust results in changes in information sharing (or vice versa)” (p. 66).

A substantial amount of previous research found that in relationships exhibiting a high amount of trust, people are more cooperative and apt to partake in social exchange (Putnam 1995; Tyler and Kramer 1996). Moreover, the literature shows that trust plays a significant role specifically in knowledge sharing (Wathne Roos and Krough 1996). Both within and between organizations, a safe environment can be nurtured, allowing individuals to feel a sense of camaraderie among the group. **When this occurs, members are more apt to participate and exchange knowledge within the IOS.**

*Proposition 3: There will be a positive relationship between trust and knowledge contribution.*

## **Identification**

Nahapiet et al. (1998, p. 256) define identification as, “The process whereby individuals see themselves as one with another person or group of people.” In interorganizational systems (IOSs), there are multiple opportunities for individual organization members to contribute knowledge to particular areas of interest; thus, they can choose areas in which they have specific domain knowledge. In this way, individuals contributing knowledge gain a sense of affiliation and connection with other IOS users. This increases members’ identification with others, allowing identification to act as a mechanism to motivate individuals to combine and exchange knowledge (Nahapiet et al. 1998).

*Proposition 4: There will be a positive relationship between identification and knowledge contribution.*

## *Boundaries*

## **Novelty**

Novelty refers to how unique the circumstances are at a boundary. Novelty can arise in a variety of circumstances, ranging from new customer needs regarding a new product to when an actor is “unfamiliar with the common knowledge being used to represent differences and dependencies between domain-specific knowledge (Carlile 2004). Two predictors of knowledge contribution that are likely to interact are novelty and social capital. While it is likely that these two variables will

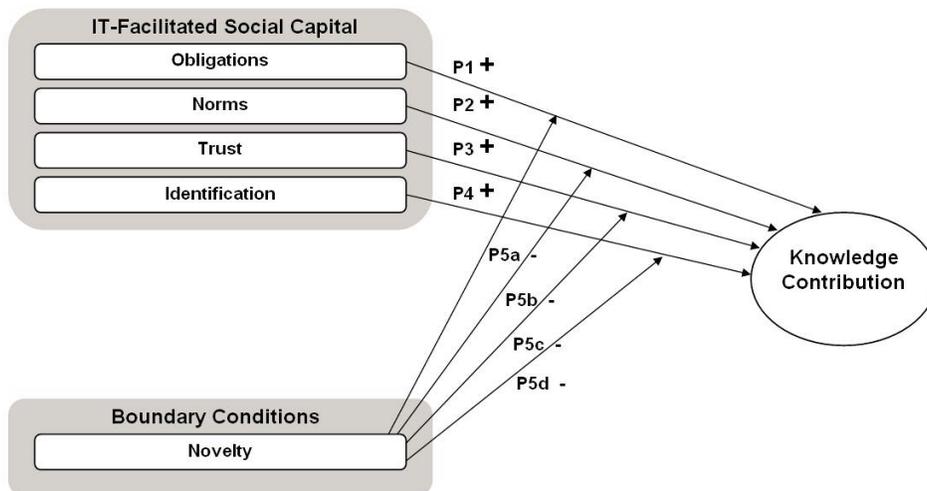
exhibit independent effects, it also seems likely that the novelty level of the boundary and social capital variables will interact to influence the amount of knowledge contribution to the IOS. Situations in which obligations, norms, trust, and identification are present, but when the novelty level of the boundary is high, they are likely to result in only moderate levels of knowledge contribution; whereas, when social capital is present and novelty is low, a stronger relationship with knowledge contribution is likely. Thus, hypotheses 5a through 5d represent the moderating effect of novelty with each individual social capital variable. An overview of the measurement model is depicted in Figure 2.

*Proposition 5a: Boundary conditions will moderate the relationship between obligations and knowledge contribution such that the positive relationship is stronger when novelty of the boundary condition is lower.*

*Proposition 5b: Boundary conditions will moderate the relationship between norms and knowledge contribution such that the positive relationship is stronger when novelty of the boundary condition is lower.*

*Proposition 5c: Boundary conditions will moderate the relationship between trust and knowledge contribution such that the positive relationship is stronger when novelty of the boundary condition is lower.*

*Proposition 5d: Boundary conditions will moderate the relationship between identification and knowledge contribution such that the positive relationship is stronger when novelty of the boundary condition is lower.*



**Figure 2. Measurement Model**

Expertise and tenure are not explicitly included in the propositions, but have been indicated as antecedents of knowledge contribution by prior research (Boland et al. 1995; Constant Sproull and Kiesler 1996), thus, they will serve as control variables. Furthermore, expertise-sharing networks are established for the sole purpose of aiding in the locating and sharing of expertise (Tiwana and Bush 2005); therefore, expertise may influence contribution to an IOS. Individuals who have spent a significant amount of time in an organization and have higher levels of expertise in the subject matter will tend to contribute more to an IOS than individuals without tenure and lower amounts of expertise. A summary of the definitions for the social capital, boundary, and knowledge contribution constructs is included in Table 1.

**Table 1. Constructs and Definitions**

| Constructs                           | Definitions   | Citations                           |
|--------------------------------------|---|-------------------------------------|
| <b>IT-Facilitated Social Capital</b> |   |                                     |
| 1. Obligations                       | Obligations refer to a commitment or duty that binds one to courses of action. . This reciprocity helps to encourage knowledge sharing in the IOS by creating a sense of responsibility to help others.   | (Nahapiet et al. 1998)              |
| 2. Norms                             | Norms occur when actions are controlled not by the individual but by others, constituting a powerful form of social capital.  | (Coleman 1990)                      |
| 3. Trust                             | Norms can motivate individuals to engage in knowledge exchange by outlining guidelines, rules, or expectations for appropriate behavior and participation. These norms must be conveyed to individuals through the IOS. Trust is defined as “one party’s confidence that the other party in the exchange relationship will not exploit its vulnerabilities.” Mechanisms to establish trust must be incorporated into the IOS. | (Putnam 1995)<br>(Dyer et al. 2003) |
| 4. Identification                    | Identification is defined as, “The process whereby individuals see themselves as one with another person or group of people.” The IOS must permit individuals to create and convey a sense of identity.   | (Nahapiet et al. 1998)              |
| <b>Boundary Conditions</b>           |   |                                     |
| Novelty                              | Novelty refers to how unique the circumstances are at a boundary. It can range from new customer needs regarding a new product to when an actor is “unfamiliar with the common knowledge being used to represent differences and dependencies between domain-specific knowledge.”   | (Carlile 2004, p. 557)              |
| <b>Dependent Variable</b>            |   |                                     |
| Knowledge Contribution               | Knowledge contribution refers to the extent to which individuals contribute new knowledge to an interorganizational system (IOS).   |                                     |

## **Discussion**

It is expected that as novelty increases in the boundary, the level of knowledge contribution to the IOS will decrease. Pragmatic boundaries are associated with the highest novelty levels, followed by semantic, and then syntactic. Therefore, pragmatic boundaries should be associated with the lowest levels of knowledge contribution. Additionally, results should indicate positive relationships between obligations and knowledge contribution, norms and knowledge contribution, trust and knowledge contribution, and identification and knowledge contribution, with these relationships moderated by the level of novelty in the boundary. Both subject matter expertise and tenure in the organization should also exhibit positive relationships to IOS knowledge contribution.

## **Expected Contributions and Future Work**

Results of this study have both theoretical and practical implications. Because researchers know little about the role boundary conditions play in assisting information technology with interorganizational knowledge sharing, a theoretical contribution of this paper is the development of a framework for understanding these relationships between organizations. Additionally, this paper represents the first attempt to propose a relationship between boundary conditions and knowledge contribution from a social capital perspective. In essence, future research should be conducted in this area to further our understanding.

From a practical standpoint, it is important for managers and key stakeholders of a firm to understand what enables knowledge contribution across boundaries because knowledge-based theory indicates knowledge as a source of competitive advantage for a firm. Therefore, the results of this study have implications for managers regarding appropriately managing boundaries in order to decrease equivocality and increase knowledge contribution to gain a competitive advantage. Attention should be given to determining ways to mitigate the novelty occurring at boundaries. A new study focused on reducing novelty at boundaries could compare and evaluate the various novelty reduction techniques to determine which are the most effective. This study would have practical implications in that it would provide concrete suggestions for managers on novelty reduction in organizations. Additionally, future research should further these implications by extending the proposed framework to look at firm performance, leading to new insights regarding the potential for competitive advantage. Additional research should also investigate antecedents to the social capital variables to further explain this process.

Research on interorganizational relationships (IORs) has mainly focused on firm level analyses, while very little has been conducted at the individual level (Klein et al. 2000). (Koh Ang and Straub 2004) argue that IORs, such as outsourcing, are inherently multilevel in nature. “Individuals are nested within organizations, which are nested within networks of organizations, which are nested within industries and national economies and cultures” (Klein et al. 2000). Similar research has suggested that IORs emerge from individual actions (Ring and Van de Ven 1994). Therefore, to help fill this void of multilevel studies in IOR research, we propose a multi-level model that applies social capital theory to understand the relationship between knowledge and boundary conditions in interorganizational relationships. Future work using this hierarchical approach would advance the study of interorganizational knowledge sharing by using a newer, and primarily unused data analysis technique, hierarchical linear modeling. Through this technique, multiple levels of analyses can be conducted, which serve to further organizational research, since little has been done from this angle. An additional opportunity for future work in this area would also include the development and testing of new measures for assessing boundary conditions. Because this type of study would be the first to use such measures, replication would be needed by researchers to confirm the validity of the newly designed instrument.

Lastly, future work on this topic would provide useful information to both managers and subordinates through the discovery of the differences in knowledge contribution between the two. Specifically, managers could utilize this information to differentiate who in the organization is contributing to the IOS. This information would help determine where additional resources should be deployed in an organization to enhance the sharing of knowledge.

## **Conclusions**

The aim of this study was to investigate and further assess the role boundary conditions play in the relationship between social capital and knowledge contribution. A theoretical model was developed and propositions were presented. The next step would be to examine these propositions using the suggested sample and techniques to determine whether they are empirically supported. The findings from this study will provide several potential areas for further investigation on the use of information technology in interorganizational boundaries.

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