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# CHARACTERISTICS OF INTERORGANIZATIONAL RELATIONSHIPS AND THE STRUCTURE OF INTERORGANIZATIONAL SYSTEMS: AN EXPLORATORY STUDY

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## Abstract

*Volume of commerce through web-enabled interorganizational systems like electronic-exchanges has steadily risen over the past years. However, universal acceptance and success of this phenomenon has not materialized. Many exchanges have suffered participation problems and many models have fallen out of favor. We argue that it is important to relate the characteristics of existing inter-firm-relationships to the structure of interorganizational systems, to realize value from such systems.*

*Prior literature has looked into antecedents and use of interorganizational systems, and generalized effect of IT on interorganizational relationships. We extend this literature by articulating that the structure of interorganizational systems is predicted by the characteristics of inter-firm relationships. We define these constructs through underlying variables. We draw from literature that explores the effect of IT on inter-firm relationships, and from organizational theory literature that addresses inter-firm relationships. We put forth propositions that relate the variables.*

**Keywords:** Interorganizational systems, interorganizational relationships, transaction costs, cooperation, power

## Introduction

Information technology has played an important role in interorganizational relationships. EDI proved to be an effective tool in the early years of IT application. The internet opened up further possibilities of using the electronic medium. Internet-based applications like electronic-exchanges rely on reach and connectivity of the internet to connect multiple trading partners. Growing business-to-business commerce conducted through internet underlines its importance (Sweeny 2002). Given the importance of the internet, there are several questions that firms need to address to effectively use interorganizational systems. On one hand firms need to consider various aspects of interorganizational systems, like technology, investment levels, and forms of participation; on the other hand firms need to understand how existing relationships are going to be affected as a result.

Prior literature has not related the characteristics of existing firm-relationships with the nature of Interorganizational system. Prior studies have investigated the antecedents of EDI use, and outcomes of EDI use (Hart and Saunders, 1998; Srinivasan et al, 1994). Another stream of study has focused on the effect of IT on the nature of Interorganizational relationships (Bakos and Brynjolfsson, 1993; Clemons et al 1993; Gurbaxani and Whang, 1991; Holland and Lockett, 1997; Malone et al, 1987). This stream has focused on specific forms of relationships – like markets and hierarchies. Typology studies use trading mechanisms, types of services, and bias of the exchanges to categorize electronic-exchanges (Dai and Kauffman, 2002; Kaplan and Sawhney, 2000). One study that uses interorganizational relationships also distinguishes and evaluates two alternative approaches that can be used to analyze adoption of IOSs by organizations (Kurnia and Johnston, 2000). The factor or variance approach adopted by a few authors employs a set of factors to empirically determine the effect of the factors on the adoption decision. Kurnia and Johnston (2000)

citing the rich and complex process of interaction between firms adopt a case study approach to understand adoption behavior. They term this detailed case based approach as the 'processual' approach.

In our study we relate the interorganizational relationship and the Interorganizational system by proposing that the characteristics of interorganizational relationship are predictors of the structure of Interorganizational systems. In doing so, we necessarily adopt a variance or factor approach to analyzing the effects of predictor variables.

We draw from previous work in IS literature that have looked into the effect of IT on Interorganizational relationships (Bakos and Brynjolfsson, 1993; Clemons et al, 1993; Gurbaxani and Whang, 1991; Malone et al, 1987). We also draw from organizational theory literature that looks into Interorganizational relationships (Oliver, 1990). We synthesize these two streams of research to define our constructs, and lay out our propositions.

The following sections are organized as follows. The next section reviews the literature, identifies the gaps, and lays the foundation for our propositions. In the subsequent section we articulate our model in terms of variables and draw from relevant literature to support our propositions. The final section summarizes the study, identifies the limitations and lays out the possibilities for future research.

## **Literature Review**

Within the IS literature characterizations of interorganizational relationships have been influenced by the theoretical underpinnings of transaction cost theory that characterizes firm relationships as either being conducted through markets or through close long lasting one to one relationships known as hierarchies (Williamson, 1981). Using this broad frame of reference studies have tried to predict whether markets, hierarchies or some other intermediate form will emerge (Clemons et al, 1993; Gurbaxani and Whang, 1991; Malone et al, 1987; Zaheer and Venkatraman, 1994).

Further, literature has established that firms undertake relationships due to considerations other than transaction-costs; for exercising power and control over resources or for joint initiatives like exploring new markets or developing new products (Oliver, 1990). One needs to draw from the developments in the field of organizational studies to better understand the interorganizational relationships.

On the other hand interorganizational systems as tools to be used in the context of inter-firm relationship have been problematic to characterize. Researchers have stressed on different aspects of technology to understand its effect vis-à-vis inter-firm relationships. Hence variously stress has been on - depending on the position of the researcher - the nature of the technology, ownership of the technology, and use of technology (Clemons and Row, 1993; Malone et al, 1987; Zaheer and Venkatraman, 1994).

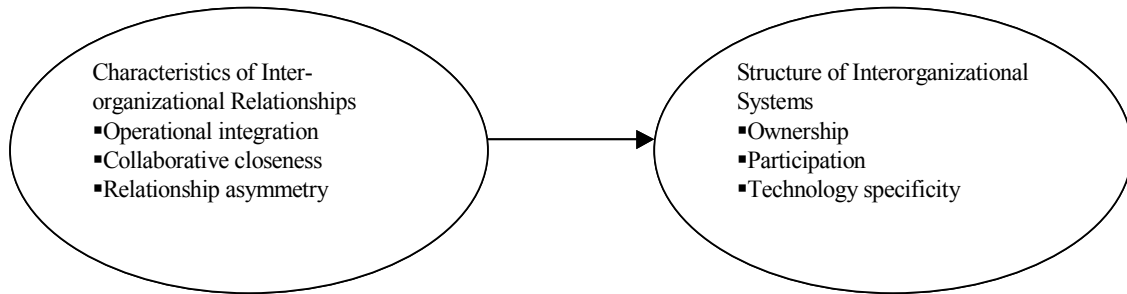
We synthesize the prior studies in information systems literature and organizational theory literature to characterize the interorganizational relationships as an extended construct and define underlying variables that the construct comprises of. Next, we look at prior research to understand what characteristics of interorganizational system are important in the context of interorganizational relationships. We define interorganizational system as an extended construct in terms of underlying variables. We then lay out our propositions that relate these variables.

## **Research Model**

Our basic proposition is presented in Figure 1 below.

### ***Structure of Interorganizational Systems***

Interorganizational systems have largely been viewed through the transaction costs lens (Clemons and Row, 1993; Malone et al, 1987; Zaheer and Venkatraman, 1994). Also, as mentioned elsewhere in this paper, electronic markets have been classified based on types of industries served, product categories served, pricing mechanism used, and biases (Dai and Kauffman, 2002; Kaplan and Sawhney, 2000). We argue that both these approaches are limited. First, a small set of typologies fails to account for the richness and variability of the different types of Interorganizational systems. Second, it does not allow us to treat this construct analytically in terms of underlying variables and study them in relation to other variables and constructs. We propose to understand Interorganizational system as an extended construct, composed of underlying variables.



**Figure 1. Research Model**

Zaheer and Venkatraman (1994) operationalized electronic hierarchies as “percentage of business directed to the interfaced carrier through the proprietary electronic channel.” Clemons et al use the term ‘move to the middle’ to imply outsourcing to a limited number of suppliers (Clemons et al, 1993). The dimension of interorganizational system these studies highlight is the nature of participation through interorganizational system. Interestingly, both point to limited participation bias of the interorganizational system but base their propositions on contradictory technological properties of interorganizational system. Clemons et al (1993) characterize the interorganizational systems as being increasingly standardized and non specific, while Zaheer and Venkatraman (1994) use a proprietary relationship specific model. Hence one needs to understand who participates through the interorganizational system irrespective of the technological nature of it. At the same time one also needs to understand technology specificity of the interorganizational system. Another important dimension of interorganizational system is who owns it. There is value proposition in using the interorganizational system, either to enhance markets or hierarchies (Malone et al, 1987). Organizations might wish to own it as a business in itself to appropriate a portion of the value created. In summary, we propose: overall structure of the interorganizational system constitutes of ownership of the interorganizational system, participatory nature of the interorganizational system, and the technology specificity of the interorganizational system. Table-1 delineates the dimensions and illustrates the various levels:

**Table 1. Interorganizational Systems Structure**

Dimensions	Levels of the dimension		
	low (market) —————>high (hierarchy)		
Ownership	Independent, or intermediary ownership	Consortium or collaborative ownership	Private ownership by a single participating organization
Participation	Many to many need-matched relationships	Intermediary-mediated preferred relationships	Self-selected fixed relationships
Technology-specificity	Broad based solution	Customized application of a mass technology	Dedicated organization specific solution

**Characteristics of Interorganizational Relationships**

Oliver characterizes the drivers of Interorganizational relationships as ‘contingencies’ that ‘explain the reasons why organizations chose to enter into relationships...’ Of all the contingencies that Oliver (1990) present, characterization of inter-firm relationships within the IS literature seems to focus on the efficiency contingency the most. This contingency refers to firms’ needs to economize on input-output performance and is predicated on costs of transaction incurred on buying and selling of goods and the cost of production. Another area of research within IS has emphasized the importance of investment in relationships by investing in items that cannot always be specified on contracts, like quality and innovation (Bakos and Brynjolfsson, 1993; Clemons et al, 1993). This theme closely parallels the reciprocity contingency of interorganizational relationships – that deals with “motives of reciprocity that emphasize cooperation, coordination and collaboration” (Oliver, 1990). Finally, a small number of works deals with the construct of power in the context of Interorganizational relationships. For example Hart and Saunders (1998), examine the influence of customer power on volume and diversity of EDI use. This perspective echoes the contingency of asymmetry that “refers to interorganizational relationships prompted by the potential to exercise power or control over another organization or its resources (Oliver, 1990).”

We propose to draw from Oliver’s contingencies to characterize relationships between firms in terms of level of operational integration, cooperative closeness, and relationship asymmetry, and attribute these observables to the contingencies of efficiency, reciprocity, and asymmetry respectively (Tables-2&3)

**Table 2. Characteristics of Interorganizational System Relationships**

	<b>Definition</b>	<b>Prior literature</b>
Operational integration	Use of technology, personnel, and equipment to exchange information or make decisions on matters related to production and transportation of goods.	Clemons et al, 1993 Gurbaxani and Whang, '90 Malone et al, '87 Bakos et al, '86 Williamson, '85
Collaborative Closeness	Joint efforts between organizations beyond the need of daily operations to address issues such as strategic planning, marketing joint ventures, technology/product development, R&D, and other non operational concerns.	Clemons and Row, '93 Bakos and Brynjolfsson, 94
Relationship Asymmetry	The imbalance in the relative power of the firms in a given relationship.	Hart and Saunders, '98

**Table3. Operationalization of Interorganizational System Relationships**

<b>Dimensions</b>	<b>Levels of the dimensions of interorganizational systemrelationships</b>			
	Low —————>High			
Operational integration	No visibility of operational variables – like production, transportation and inventory status.	Partial access to operational information, but decisions made independently	Access to information. Rules set in place for corrective actions.	Full information integration, as well as joint decision making beyond rule based actions
Collaborative closeness	No collaboration beyond transactional needs	Collaboration initiated and maintained at functional levels	Functional collaboration initiated at top decision making levels	Joint strategic planning, collaboration spanning functions, initiated at highest decision making levels.
Relationship asymmetry	Firms not much different on account of underlying power factors	Firms differ in underlying power factors on at least one account	Substantial asymmetry —but not exercised by the way of coercion or gaining favorable terms of trade	Asymmetry exists, history of consistent leveraging off of the asymmetry

Ownership of an interorganizational system confers on the owner privileges to mold the system and accommodate the requirements of the relationship. It has been argued by researchers how interorganizational system confers operational efficiencies (Clemons et al, 1993; Malone et al, 1987; Zaheer and Venkatraman, 1994). Further, as the level of operational integration grows, processes become more specific to the relationship. For an independent market maker, it is highly inefficient to configure applications that suit each of its users. It can be argued that cooperative closeness over matter such as research or joint planning gives rise to relationship-specific practices. Hence firms will be forced to preserve the existing practices in cases of high levels of cooperation through the ownership of the interorganizational system. Relationship asymmetry in relationships is a strong incentive to own and mold the channels of interaction and communication between firms. On the other hand firms might not want to invest in and own interorganizational systems for relations that are characterized by little or non existing integration, cooperation, or closeness. Hence:

*Proposition 1a: Level of operational integration will be positively associated with ownership of Interorganizational systems.*

*Proposition 1b: Level of collaborative closeness will be positively associated with ownership of Interorganizational systems.*

*Proposition 1c: Level of relationship asymmetry will be positively associated with ownership of Interorganizational systems.*

Participation structure refers to whether there is many to many interactions as would be expected of open-market systems or organizations stick to a preferred set of business partners. Relationships that are characterized by preexisting integration, close nature of collaboration and high relative power of an organization in a relationship will tend to limit the use of interorganizational system to a pre-selected group of partners. On the other hand, firms might benefit by seeking newer partners if their existing levels of integration or cooperation do not tie them up with specific partners. Hence:

*Proposition 2a: Level of operational integration will be positively associated with level of participation in Interorganizational systems.*

*Proposition 2b: Level of collaborative closeness will be positively associated with level of participation in Interorganizational systems.*

*Proposition 2c: Level of relationship asymmetry will be positively associated with level of participation in Interorganizational systems.*

The nature of technology has been long argued to play a role in determining the nature of interorganizational relationships. Zaheer et al's (1994) characterization of electronic integration rests on the use of proprietary technology. Clemons et al (1993) point us to standardization of technology. The nature of technology itself can be a limiting factor in enabling inter-firm relationships. Hence firms that rate high on integration would tend to use more customized technologies, similar will be the case with firms in close cooperation with other firms. Firms have been known to use power to force adoption of selected technologies (Hart and Saunders, 1998). Hence:

*Proposition 3a: Level of operational integration will be positively associated with technology-specificity of Interorganizational systems.*

*Proposition 3b: Level of collaborative closeness will be positively associated with technology-specificity of Interorganizational systems.*

*Proposition 3c: Level of relationship asymmetry will be positively associated with technology-specificity of Interorganizational systems.*

## **Discussion**

In this exploratory study we extend the literature by providing a link between the existing interorganizational relationships and the structure of interorganizational systems. Further, we have operationalized these constructs in terms of underlying variables, there by providing a necessary step toward empirical verification. We are working on designing appropriate methodology to use for the empirical verification of our propositions. We are also working on enhancing the model by adding moderating variables that might influence the proposed relationship.

For the practitioners we provided a means to evaluate the interorganizational system on the basis of the nature of existing relationships. This to a large extent addresses the issue of dissatisfaction with electronic-exchanges raised in the trade literature (Sweeny 2002) that can be largely attributed to the mismatch between needs of existing relationships and inability of the interorganizational systems to meet those needs.

## **References**

- Bakos, J. Y., Brynjolfsson, E. "Information Technology, Incentives, and the Optimal Number of Suppliers." *Journal of Management Information Systems*, (10:2), 1993, pp. 37-53
- Clemons, E.K., Reddi, S.P., Row, M. C. "The impact of Information Technology on the Organization of Economic Activity: the "Move to the Middle" Hypothesis." *Journal of Management Information Systems*, (10:2), 1993, pp. 9-35
- Dai and Kauffman. "Business Models for Internet-Based B2B Electronic Markets." *International Journal of Electronic Commerce*. (6:4); 2002, pp. 41-72
- Gurbaxani, V., Whang, S. "The impact of Organizations System on Organizations and Markets." *Communications of the ACM*, (34:1), 1991, pp. 59-73
- Hart, P. J., Saunders, S. C. "Emerging Electronic Partnerships: Antecedents and Dimensions of EDI Use from the Supplier's perspective." *Journal of Management Information Systems*, (14:4), pp. 87-111
- Holland, C.P., Lockett, A. G. "Mixed Mode Network Structures: The Strategic Use of Electronic Communication by Organizations." *Organization Science*, (8:5), 1997, pp. 475-488
- Sweeny, T. "Private Exchanges Take Hold", Internetweek.com, January 30 2002, <http://www.internetweek.com/newslead02/lead013002.htm>.
- Kaplan, S., Sawhney, M. "E-Hubs: The New B2B Marketplaces." *Harvard Business Review*, May-June 2000, pp. 97-103
- Kurnia, S., Johnston, R. B. "The need for a processual view of interorganizational systems adoption." *Journal of Strategic Information Systems*, Vol. 9, 2000, pp. 295-319
- Malone, T.W., Yates, J., Benjamin, R.I. "Electronic Markets and Electronic Hierarchies." *Communications of the ACM*, (30:6), 1987, pp. 484-497
- Oliver, C. "Determinants of Interorganizational Relationships: Integration and Future Directions." *Academy of Management Review*. (15:2); 1990, pp. 241-265
- Srinivasan, K., Kekre, S., Mukhopadhyay, T. "Impact of Electronic Data Interchange Technology on JIT Shipments." *Management Science*, (40:10), pp. 12191-1994
- Williamson, O.E. "The Modern Corporation: Origins, Evolution, Attributes." *Journal of Economic Literature*, Vol. 19, pp. 1537-1568
- Zaheer, A., Venkatraman, N. "Determinants of Electronic Integration in the Industry: An Empirical Test." *Management Science*, (40:5), 1994, pp. 549-566.