Toward A New Framework for Interorganizational Systems: A Network Configuration Perspective

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Abstract

This paper addresses the need to incorporate the increasing trend of partnerships being formed among business firms into a framework for interorganizations. The existing frameworks for classifying interorganizational systems are either conceptually too complex to be readily applicable to IOS planning or too outdated to explain numerous forms of emerging global communication networks. Based upon two dimensions, namely horizontal and vertical electronic linkages between organizations, we propose a new IOS framework which classifies IOS into three types, including (1) horizontal, (2) vertical, (3) cross. The framework conceptually draws upon the orientation of roles played by organizations joining the IOS. We review select cases that fit into each IOS category and draw characteristics of systems of each category. The paper concludes with suggestions for applying the framework to the development of an IOS-enabled corporate strategy.

1. Introduction

As the business environment grows more competitive and introduces more global pressures, firms are compelled to use innovations to create and sustain a competitive edge. For the past few decades, we have seen an increasingly growing number of companies use information technology beyond the operational and management support (Rackoff et al., 1985). In particular, with the rapid advance of the telecommunications technology, firms sought strategic opportunities from the computer networks linking organizations. The information and communications technology that transcends organizational boundaries has been termed interorganizational systems (Cash and Konsynski. 1985; Applegate et al., 1996; Kumar & Dissel, 1996). The interorganizational systems (IOS) have functioned to blur the boundaries of today's organizations as they enable information to flow from one organization to another (Konsynski,1993).

The most common purpose of traditional interorganizational systems was to support the value chain of a firm, so that firms can better compete in the fierce market. Interorganizational systems that have emerged in recent years, however, increasingly support partnering among organizations. That is, there is a shift in the role of information technology – from a competition weapon to a cooperation enabler among business firms (Kumar and Dissel, 1996). It is necessary to view interorganizational systems in a broader context that encompasses not only the traditional value chain linkage but also partnerships and strategic alliances among firms within an industry. This paper addresses the need to incorporate the increasing trend of partnerships being formed among business firms into a framework for interorganizational systems. The existing frameworks are either too complex to be applied to IOS planning or too outdated to explain numerous forms of emerging global communication networks.

The purpose of this paper is to present a new conceptual framework that draws upon the orientation of roles played by organizations interconnected by an IOS. The framework categorizes IOSs into three types, including (1) horizontal, (2) vertical, and (3) cross. We review select cases that fit into each IOS category and draw characteristics of systems of each category. The framework will enable us to explore the new IOS opportunities and develop an IOS-enabled corporate strategy to exploit such opportunities.

2. The IOS Concept

The term IOS was born in early 1980's, as Barrett and Konsynski (1982) used the term "inter-organizational information sharing system" for the first time and Cash & Konsynski (1985) first coined the term "inter-organizational system" to refer to an automated information system shared by two or more organizations. An IOS is defined as a network-based information system that extends beyond traditional enterprise

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boundaries (Konsynski, 1993). With IOS permitting information access to other organizations, an organizational boundary is redefined and extended to the extent that a firm's value chain needs to be redesigned. There are many well-known classical examples: American Airlines' SABRE, American Hospital Supply's ASAP, and so on.

Today the information systems technology acts as an enabler of the transformation of organizations. In particular, the IOS is a category of information systems moving in this direction. Business organizations increasingly establish electronic links with their competitors or with firms in different industries to gain a competitive advantage. Information technology is now used to enable cooperation more than competition among firms. In this regard, Kumar and van Dissel (1996) conceptualize IOS as planned and managed cooperative ventures between otherwise independent agents. Today, IOS-enabled partnerships and alliances among firms make it possible to seek business opportunities via new organizational and market relationships formed.

IOSs exhibit unique characteristics that often act as incentives for IOS development. Bakos (1991) states that three characteristics are associated with IOS. First, an IOS decreases the costs of exchanging and acquiring information on the part of participating firms. Second, the benefits for the IOS innovator increase as the number of firms joining the network increases. Third, considerable switching costs incur as a result of shifting from one IOS to another.

3. Related Literature

The IOS research to date has produced a number of articles that attempted to illuminate numerous aspects of interorganizational networking. The research articles that focused on ways of classifying interorganizational systems, however, are not many.

Barrett and Konsynski (1982) classify IOSs based on five levels of IOS participation. At level 1, a firm simply accesses a system that is run and operated by other companies. Level 2 participants design, develop, maintain, and share a single application such as a customer order processing system. Level 3 participants take responsibility for a network in which lower-level participants may share. Level 4 participants develop and share a network with diverse applications that may be used by many different types of lower-level participants. At level 5, any number of lower-level participants may be integrated in real time over complex operating environments.

Johnston and Vitale (1988) developed a classification framework using four dimensions including business purpose, relationships with participants, and information function. The framework takes the form of a decision tree where the three dimensions are sequentially interconnected. 'Business purpose' indicates why an IOS is needed; it could be either to leverage present business or to enter new information-driven business. 'Relationships' refer to who will be linked by the system; the IOS participants could be customers, dealers, suppliers, and competitors. 'Information function' is concerned with what functions the system is intended to perform; it may process boundary transactions, retrieve and analyze shared information, or be internally used. When taken together, these three dimensions produce 24 possible combinations (=2x4x3), far more than one can think at one time. Thus this framework suffers from the complexity that makes it hard to analyze characteristics of each category. It also is not so much a framework to classify an IOS as one to study the relationships among the factors related to IOS.

Kumar and van Dissel (1996) presents a typology for interorganizational systems based on the concept of interorganizational interdependence. They view IOS as a technology designed and implemented to operationalize interdependent relationships between the joining organizations. Based on three types of interdependent relationships including pooled interdependency, sequential interdependency, and reciprocal interdependency, their framework comprises pooled information resources IOSs, value/supply-chain IOSs, and networked IOSs. The first type, pooled information resources IOSs, is an interorganizatinoal sharing of common IT resources. Examples in this category include common databases, common communication networks, and common applications. These provide economies of scale and consequent cost and risk sharing. The second type of IOS, value/supply-chain IOS, supports customer-supplier relationships and occurs as a consequence of these relationships along the value/supply chain. These IOSs institutionalize sequential interdependency between organizations. Order-entry and processing systems and CAD-to-CAD IOS belong to this type. Finally, networked IOSs operationalize and implement reciprocal interdependencies between organizations. They are exemplified by joint marketing programs where firms exchange mutual advantages. According to the authors, this is the most complex and subject to high conflict between the participants.

The prior research work on the classification of IOS lacks the perspective of network configuration. What they base classification upon are numerous: modes of IOS participation, why-who-what of IOS, interorganizational interdependence, and so forth. While Kumar and van Dissel's (1996) work on

interorganizational interdependence is related to the IOS configuration, it incorporates into the framework only those IOSs built for the organizations with interdependent relationships, lacking a comprehensive spectrum. Focusing on the fundamental configuration types of an IOS will lead us to a new perspective on IOS categorization.

4. The Configuration of Interorganizational Systems

Interorganizational systems can be configured in various ways. The IOS can be set up as one-to-one as in a typical buyer-seller system, one-to-many as in a marketing or purchasing system, or many-to-many as in electronic markets, based on the interaction patterns between the participants (Konsynski, 1993). The IOS can also be configured according to the type of interdependence existing between the firms joining the network (Kumar and van Dissel, 1996), as we have seen in the literature review section. We can envision the configuration of an IOS associated with each interdependence type. The pooled interdependency requires a star-like IOS in which data movement is directed toward the central hub. With an IOS for the sequential interdependency, nodes are arranged like a straight line where the output of one node become the input of the next node. The third type, reciprocal interdependency, necessitates quite a complex IOS in which participants are dependent upon one another. The existing views of the IOS configuration focus on the physical interconnection of, and/or data flows between, the participating firms.

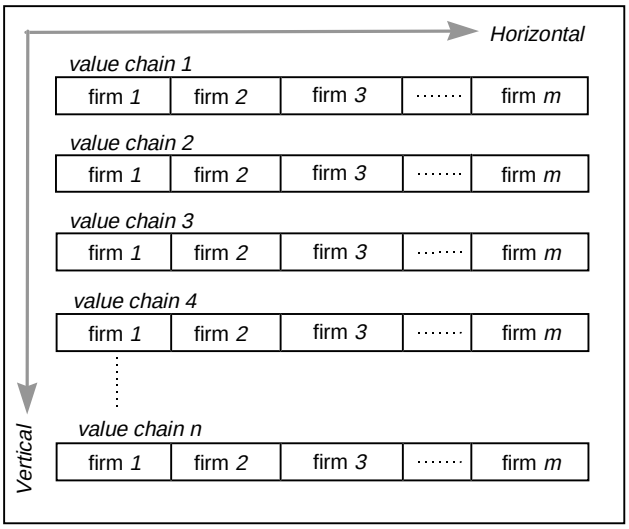

Figure 1. Horizontal and vertical linking of firms over an IOS

The configuration of an IOS, however, can be viewed from a different perspective – i.e., in terms of horizontal and vertical electronic linkages between organizations. As shown in Figure 1, the IOS configuration can be either horizontal or vertical. The linkage between heterogeneous, but related, value chains is vertical, whereas the linkage between firms spanning a homogeneous value chain is horizontal. Then, a firm's IOS can be described in terms of the horizontal and vertical linkages.

It seems that the way that an IOS is configured is associated with the purpose or the strategy of IOS. For example, organizations are horizontally connected for the primary purpose of cooperating with the competitors. On the other hand, organizations can seek vertical interconnection when it is important to team up with their buyers, sellers, or organizations who may provide complementary products or resources. This line of thinking will allow us to develop a new framework for interorganizational information systems.

5. A New Framework for Interorganizational Systems

In this section, we use the concept of horizontal and vertical linkages to gain a perspective on IOS configuration and develop a new framework for classifying IOS, with emphasis upon whom your IOS is concerned to – i.e., customers, suppliers, affinity organizations, or competitors (Tapscott and Caston, 1993). We first examine the two dimensions.

5.1. The Horizontal Linkage Dimension

The horizontal linkage of an IOS is formed via interconnection of firms performing common value activities. In this regard, horizontal linkage can be defined as the degree to which an IOS links a homogeneous group of organizations in order to foster their mutual cooperation. Homogeneous organizations are those that are engaged in the common business with comparable product lines and who access the common market. In other words, they share a common role – i.e., contribution of identical inputs toward the augmented output.

In recent years, the trend of horizontal linking is on the rise as partnerships and alliances between competitors are increasing. Gurbaxani and Whang (1991) argue that the incentives for horizontal integration include exploitation of the scale economies in operations and savings in horizontal market transaction costs. Konsynski and McFarlan (1990) suggest that the

driving force in 'information partnership' is the sharing of large investments in hardware and software to reduce potential risk as well as of the considerable training expenses. Sharing of technical burden may motivate firms to join the information partnership, especially when a project demands high-level skills and expertise (Tapscott and Caston, 1993). In addition, inter-firm cooperation can be motivated by a behavioral reason; partnering between intra-industry firms can standardize on a user interface so that users do not have to learn different interfaces of different firms (Applegate et al., 1996).

One critical issue in using the horizontal linkage dimension in the framework is the measurement of the degree of horizontal linkage in IOS. For the purpose of this paper, we let the horizontal linkage be defined by the strength of ties between the firms joined. If the inter-participant ties are fairly strong, then the horizontal linkage is considered to be high. The strength of ties between firms is often related to the purpose of an IOS. Typically, horizontal cooperation motivated by strategic drives (e.g., market coalition, strategic alliances, etc.) tends to render the ties strong, hence yielding high linkage. On the contrary, unusually weak ties stemming from non-strategic cooperation will be associated with low horizontal linkage.

5.2. The Vertical Linkage Dimension

The vertical linkage refers to linking of different roles played by participating organizations in order to add value to existing products or services. Traditionally IOSs linked to organizations in other value chains more than to organizations within a single value chain. The classical IOS example, America Hospital Supply's ASAP, involves electronic links between the hospital supply manufacturer and the healthcare organizations. The well-known reservation system SABRE created by American Airlines is an IOS connecting the carrier with the travel agencies. These buyer-seller networks typically are designed to support the value chain of an IOS participant. Theoretically, the degree of vertical linkage is high as a firm is highly vertically integrated. More recently, IOSs linking firms for their reciprocal relationships are noticeable. These firms who cooperate to exchange mutual advantages join vertically arranged IOS.

As in horizontal linkage dimension, measurement along the vertical linkage dimension becomes an issue that needs a decision. It would be logical to consider the heterogeneity and variety of unique value chains linked over the vertical IOS span. The more heterogeneous and the more various the value chains linked by an IOS, the more unique roles the participants play and the higher the vertical linkage. When companies cooperate for reciprocal advantages, each joining firm plays a distinct role and therefore the linkage tends to get high in many cases. With an IOS to support the buyer-seller relationship, the vertical linkage is not as high, because the IOS spans two or, at most, three hierarchical levels.

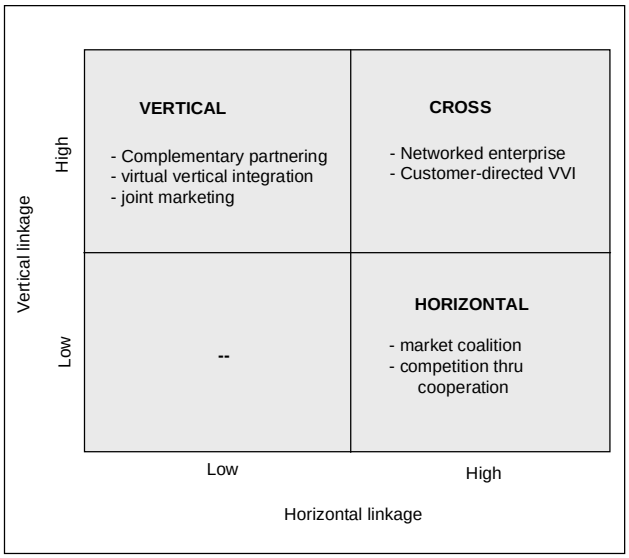

Figure 2. A Framework for Interorganizational Systems

5.3. The Four Categories of IOS

Depending on the horizontal and vertical orientation of the IOS linkage, the IOS is categorized into three types: horizontal IOS, vertical IOS, and cross IOS. The classification framework is shown in Figure 2. The horizontal IOS enables competitors to form a market coalition to create a critical mass. The vertical IOS facilitates not only vertical integration but complementary partnership. Finally, the cross IOS is an IOS arrangement that is both horizontally and vertically linked to foster the transition into a fully networked enterprise that is strategically focused. Each of the three categories is described below.

Horizontal IO. Belonging to this category of IOS are those that are high in linkage between the participants in competition but have little linkage between roles of participants. Firms implementing this type of IOS, in general, aim at forming a coalition to compete with large firms, expanding markets, or increasing the quality of customer service via information sharing. This type of information partnering can embrace either competitors or non-competitors, depending on the type of partnership. Examples of horizontally arranged electronic linkage

include: small and mid-sized warehouse companies teaming up to create an joint VAN; a group of independent insurance companies entering in partnership to fight a major national insurance firm; airliners building joint databases to share information on competitors' flights and reservations.

(1) *THIASCO (The Hotel Industry Switch Company):* THIASCO is the partnership of 17 hotel chains created to deal with the problem of reservations by travel agents. Traditionally, building and maintaining CRS (customer reservations systems) by an individual hotel chain required great technical capabilities and were very costly. THIASCO provided a unified reservation interface to which the individual hotel CRSs were connected. The system helped travel agencies reduce hotel reservation costs and book for rooms more effectively (Tapscott & Caston, 1993).

(2) *IVANS (The Insurance Value Added Network Services):* Frequently cited in the SIS literature, IVANS is a group of independent insurance companies with thousands of agents. The system was created by the industry trade association, ACORD, to cope with their loss of market share to direct sales forces from State Farm Allstate. The IOS permits independent agents across the US to access property & casualty insurance companies for policy issuance, price quotation, and other policy-related information. Therefore, IVANS is the market coalition to fight major competitors (Neumann, 1994; Konsynski and McFarlan, 1990).

(3) *AutoNetwork:* Developed for a cluster of used part suppliers to exchange information and make their industry competitive, AutoNetwork is a good example of using an IOS technology to create a virtual warehouse that, in fact, consists of many individual suppliers. Automobile dismantlers, often called wrecking yards, sell reusable parts to garages, body shops, insurance companies, and individuals, and it is important for them to exchange part availability information. The traditional voice hotlines that are basically telephone networks of auto dismantlers have been replaced by a computer network that interconnects the dismantlers in the U.S. A dismantlers sends a part request in e-mail which is broadcast to all the parties joining the network, and one who has the requested part replies via e-mail, too. The virtual warehouse of user parts functions as a large central parts warehouse to help locate parts more effectively (Tapscott and Caston, 1993).

(4) *Travelers insurance company:* Travelers is one of the insurance companies providing for managed health care that focuses on maintaining standards of health care quality, as well as on controlling increases in health care costs. The essence of managed care is information; the more relevant information that is available to all participants in the health care delivery system, the more that physicians and hospitals will provide the right treatment and the right service at the right time and the care will be of higher quality and less expensive. The company created the CareOptions medical management system to provide medical personnel access to large databases with millions of case histories that could guide treatment decisions for patients. The goal was to use information technology to help make the correct diagnosis the first time without unnecessary tests and to provide the physician or hospital with the information needed to select the quality treatment at a reasonable cost. The system represented a combination of local medical expertise with the administrative resources of a national company. The providers, customers and insurers can access information on how patients' conditions were diagnosed and treated, what each provider did, and what the outcome was. This is part of a strategy of making available the huge volume of experience so as to make better clinical decisions (Tapscott and Caston, 1993).

Vertical IOS. Together with the horizontal counterpart, the Vertical IOS resulted from what Konsynski and McFarlan (1990) refers to as 'information partnership.' This category of IOS represents a form of cooperation between firms playing different roles in a value chain. In general, the prime purposes of vertical linkage include internal process efficiency, market access, and complementary advantages. Examples include: a manufacturer linking with its customer for order entry and processing; a department store partnering with a credit card company, merchandise suppliers, delivery service companies, and warehousers; a credit card company contracting with an air carrier to offer bonus miles with every credit card purchase.

(1) *Toys 'R' Us:* The largest toy chain, Toys 'R' Us established EDI links to its suppliers in late 1980s. The system now transmits purchase orders, invoices, and other transaction-related documents over the electronic links. In addition, it sends point-of-sale data to its vendors so that they can analyze the data to predict the future demand. The

EDI-based IOS also links to "automated distribution centers" to receive electronic notices of shipments from suppliers before their arrival (Tapscott and Caston, 1993).

(2) *Sears Roebuck & Co:* Sears also created an EDI network to connect to its 5,000 suppliers. Capable of processing 21 million purchase orders annually, the IOS is designed to improve the quality of information exchanged between Sears and the suppliers and to speed up information exchange. As a result of applying the technology, Sears was able to reduce transaction errors and also processing costs (Tapscott and Caston, 1993).

(3) *LeviLink:* Levi Strauss & Co. developed LeviLink to link with the retailers in 1989. The system supports a wide range of purchasing-related processes, including ordering, stocking, receiving, analyzing sales, invoicing, and making payments. The use of LeviLink has led to remarkable results – 25% more sales, 25% less inventory, 34% higher profits, dramatic improvements of the retailer's receiving operations, and improved customer service (Tapscott and Caston, 1993; Neumann, 1994).

(4) *Nike, Inc.:* Nike outsourced footwear production to contractors in Asia to focus on product design and marketing; that is, they vertically disintegrated their value chain. In 1980s, the technicians who had been charged with control and coordination over the production process were replaced by an IOS that linked U.S. designers with Asian contractors with a CAD/CAM system. The interorganizational coordination and control system built by Nike monitored each phase of production process from production design through sales.

(5) *Reuters Holding PLC:* A reputed British news agency, Reuters, expanded its traditional news agency services to span the entire value-added chain of securities information services. Reuters integrated stock/news reporting, stock quotation systems, deal settlement networks, and exchange systems. In addition, Reuters also purchased Rich & Company, a leading developer of computerized trading systems. The coordination requirements resulting from the vertical integration are now met by an IOS linking the various activities (Gurbaxani and Hwang, 1991).

(6) *UAL & SAS:* Air carriers, including UAL and SAS, have attempted to offer an integrated travel service that combines the airline, car-rental, and hotel businesses using a CRS. The prime motive of the virtual vertical integration along the service value chain was to provide the traveler with a comfortable value-added service (Gurbaxani and Hwang, 1991).

(7) *J.C. Penny's:* One of the leading department store chains in the U.S., J.C. Penny's uses the Bank Card Network to have their bank automatically or on credit transfer payments to a supplier when ordered merchandise has been received.

Cross IOS. An IOS can be configured to establish both horizontal and vertical linkages. This is a situation where differentiation-enabled benefits resulting from vertical cooperation are combined with resource-oriented incentives of horizontal cooperation. In this regard, key motives of a cross IOS should be examined in terms of these two aspects. Firms implementing this type of IOS typically are strategically motivated, and the operations of some of these companies are heavily dependent upon information technology. For this reason, the IT investment in these firms often represents a large portion of the corporate budget, and their IT managers have an extensive understanding of the role of information technology (Ferguson, 1990). Airline companies and banks are representative of implementers of IOS in this category.

(1) *ECONOMOST:* McKesson Corporation, a distributor of drugs, healthcare products, and other consumer goods, has built ECONOMOST, a form of order entry and inventory management system, that provided for electronic links between McKesson and the independent drug stores that exclusively sold McKesson's products. This horizontal linkage based on the buyer-seller relationship was coupled with the vertical linkage formed by the coalition of the independent drug stores intended to challenge the market attack by large drug chains. This form of partnership in which small companies seek the advantages of vertically integrated companies is referred to as VAP (value-adding partnership) (Neumann, 1994). VAPs can secure the benefits of economies of scale by sharing such resources as purchasing function, warehouses, research and development centers, and information.

(2) *Canadian Airlines:* Canadian Airlines united with numerous international airlines including Qantas, Lufthansa, Scandinavian Airlines, British Airways, Air France, and Aloha Airlines for the purpose of exchanging frequent flyer points. At the same time, Canadian Airlines entered the information

partnership with Canadian Pacific Hotels, Delta Hotels, Doubletree Hotels, Swissotel, Ramada International Hotels in order to provide an integrated travel service. A Canadian Airlines customer can now enjoy not only the flexibility of a multi-airline frequent flyer program but the convenience of integrated travel reservations.

(3) *Citibank:* A global financial institution, Citibank allied with American Airlines, Mariott Hotel, and a national supermarket chain to offer the CityCard and use a computer-based network to capture the data of POS transactions processed through the CityCard into a database. Citibank used this information to give bonus points with purchases exceeding a certain amount, to offer product discounts by electronic coupons, to give a rebate on select product purchases, and to connect the POS database to an electronic payment system so that the purchase amount charged to the credit card get automatically withdrawn out of the customer account in the bank. Meanwhile, Citibank created Citisatcom, a satellite communication network to facilitate the operations of the regional credit card centers. In addition, Citibank rely on the Global Transaction Network to ally with banks in the U.S. and Japan.

(4) *Singapore Tradenet:* While most of the above examples are innovations created by businesses, there are some IOSs developed under government initiatives. Tradenet is an EDI system created by Singapore government to facilitate computer-to-computer exchange of inter-company documents in a standard format known as EDIFACT (Applegate et al., 1996). This nationwide system tremendously reduced the turnaround time for trade document processing, and speeded up the movements of shipments. With the improvement of logistics, they found better use of trucks and other equipments and could therefore organize shipments more efficiently. Singapore Tradenet connect all parties concerned, including traders (shippers and receivers), intermediaries (freight forwarders, agents, carriers), financial insitutions (banks and insurance companies), an airport, and related government bodies. In this huge nationwide IOS, each connected party plays one of very diverse, distinct roles in the giant value chain of trading.

6. Analyzing the Examples with the Framework

6.1. Horizontal IOS - positive-sum game

IOSs designed to support partnership between firms within an industry are in general characterized by using 'joint databases' to facilitate information sharing by the participants. At the core of the telecommunications infrastructure are VAN (value-added networks) that permit information sharing. Most important, these systems purport to form a coalition to create a market power or to distribute investments or operational costs among the participating firms. The degree of horizontal linkage for most of these systems is fairly high because business processes of the participants heavily rely on the IOS. That is, the ties between the participants are considered strong.

Innovator	Participating Organizations	System Purpose	Benefits	Key Technology
THIASCO	17 hotel chains	a joint CRS developed; reservation process change	efficiency and ease of hotel reservations; more efficient CRS management	DB; telecommunications
ACORD (IVANS)	independent insurance companies	formation of a coalition to compete with a large insurer; information sharing	increase in market share	DB; telecommu-nications
Incomnet (Auto-Network)	used part suppliers (auto dismantlers)	exchange of used part availability Information; creation of a virtual warehouse	easier and faster information exchange; quicker turnaround time; revenue increase	DB; e-mail; telecommu-nications
Travelers insurance company	hospitals, physicians, insurers, customers	sharing of case history DB for correct diagnosis	provision of quality health care; health care cost control	DB; telecommu-nicaitons

6.2. Vertical IOS - value-adding differentiation

IOS examples in this category are shown to strongly reveal the 'interdependency' relationships among the participants – e.g., between buyer and seller, between vertically integrated organizations, between firms exchanging reciprocal advantages, etc. IOSs are designed to manage such relationships in a manner to foster control and coordination. These systems often require a differentiation strategy for they are directed at adding value for the customers. In addition, Vertical IOS are associated with two motives: the value/supply chain support and access to reciprocal resources. The degree of vertical linkage in the examples for value/supply chain support is moderate with IOSs simply connecting buyers and sellers. Meanwhile, vertical linkage in the IOSs for reciprocal resource access is higher, as the participants play more diverse, distinct roles (e.g., airliners, car-rentals, and hotels).

Innovator	Participating Organizations	System Purpose	Benefits	Key Technology
Toys 'R' Us	suppliers	document transmis-sion; purchasing	more efficient ordering; more timely shipments; improved communication	EDI
Sears Roebuck & Co.	suppliers	document transmis-sion; purchasing	decreases in transaction errors & processing costs; improved communication	EDI
Levi Strauss & Co. (LeviLink)	retailers	integrated order processing	increase in sales; decrease in inventory costs; faster shipments; improved customer service	telecommu-nications
Nike, Inc.	production contractors in Asia	facilitation of communi-cation between designers and contractors	virtual vertical integration; control and coordination over outsourced production	telecommu-nicaitons
Reuters Holding PLC	security firms, computerized trading firm	facilitation of communi-cation	coordination for vertical integration	telecommu-nications
UAL, SAS, and other air carriers	car-rentals, hotels	provision of integrated travel service	value added service; revenue increase	CRS; telecommu-nications
J.C. Penny's	banks	payment transfer to suppliers	faster and more efficient processing of payments; increased supplier satisfaction;	EFT

6.3. Cross IOS - both positive-sum game and value-adding differentiation

Cross IOSs are more strategically focused and more clearly linked with organizational goals than the other three categories of IOS, as exhibited in the above examples. The systems are based on more market-oriented strategies, and are larger in scale. These systems pursue resource-oriented incentives (from horizontal linkage) coupled with differentiation-enabled benefits (from vertical linkage), accompany major business process changes, and therefore require very cautionary, long-range corporate planning. In the above examples, Singapore Tradenet and Citibank show relatively high vertical linkage. As to the horizontal linkage, the four examples are all high, as the ties between the joining organizations are rooted in inter-competitor cooperation designed to not only enlarge each participant's share in the game but build long-term competitiveness.

Innovator	Participating Organizations	System Purpose	Benefits	Key Technology
McKesson Corpora-tion (ECONO-MOST)	drug distributor, independent drug stores	enabling of VAP (value-adding partnership)	economies of scale resulting from virtual vertical integration; increased competitiveness	telecommu-nications
Canadian Airlines	airlines, hotels	exchange of frequent flyer info.; airline-hotel combined service	easier reservations; improved customer service (differentiation)	telecommu-nications; DB

Citibank	bank, airlines, hotel, supermarket chain	sharing of sales transaction data; inducing sales; automatic payment	increased sales; more efficient payment processing; improved customer service (from the inter-bank alliance)	POS; DB; telecommu-nications; satellite network;
Singapore Govern-ment	traders, banks, insurance companies, gov't bodies	electronic exchange of trade documents	reduced turnaround time for processing; improved logistics	EDI

7. Conclusions

This paper presents a new classification framework for interorganizational systems, based on the network configuration types. While the ways that an IOS network can be configured are numerous, they are essentially variations of three basic types: horizontal, vertical, and cross.

The present IOS framework provides us with some insights into IOS strategic planning. Firms that consider introducing Horizontal IOS can rely on the *growth strategy* designed to expand the market, and consider joint DB as a key means to share information. Vertical IOS can be implemented via the *differentiation strategy* in which the existing product or service is value-added by integrating products or services spanning a few value chains into a single package or by linking with buyers' value chain. EDI, e-mail, or POS are sample technologies to take into consideration. Finally, Cross IOS should be accompanied by an *innovation strategy* that uses IT as a strategic weapon, and use such technologies as internet and other global telecommunications networks to enable information sharing and control/coordination. Also, recognizing that Cross IOS is a combined from of horizontal and vertical IOS types, it would make sense to attempt to use the growth strategy in conjunction with the differentiation strategy.

Future research should focus on empirically validating the framework through field surveys in which the characteristics and strategy of each IOS category are examined in the real-world settings. In particular, studies investigating the link between the strategy used and the IOS category would yield useful implications for IOS planning. Also, it will be important to investigate the relationship between the degrees of horizontal and vertical linkages in an IOS and the strategy choice.

References

1. Applegate, Linda M., F. Warren McFarlan, and James L. McKenney. Corporate Information Systems Management*: Text and Cases* (4th ed.), Chicago: Irwin, 1996.

2. Bakos, J. Y. "A Strategic Analysis of Electronic Marketplaces," *MIS Quarterly, Vol.15, September 1991, pp.295-310.*

3. Cash, J. I. And Benn R. Konsynski, "IS Redraws Competitive Boundaries," *Harvard Business Review,* Cmarch-April 1985, pp.134-142.

4. Clark, T. H. and D. B. Stoddard. "Interorganizational Business Process Redesign: Merging Technological and Process Innovation," *Journal of Management Information Systems*, Vol.13, No.2, Fall 1996, p.9-28.

5. Ferguson, Charles H. "Computers and the Coming of the U.S. Keiretsu," *Harvard Business Review*, July-August 1990.

6. Gurbaxani, V. and S. Whang, "The Impact of Information Systems on Organizations and Marrkets," *Communications of the Acm,* January 1996, pp.59-73.

7. Johnston, H. R. and M. R. Vitale. "Creating Competitive Advantage with Interorganizational Information Systems," *MIS Quarterly*, June 1988.

8. Kaufmann, F., "Data System that Cross Company Boundaries," *Harvard Business Review,* CJanuary-February 1966.

9. Konsynski, B. R. "Strategic Control in the Extended Enterprise," *IBM Systems Journal*, Vol.32, No.1, 1993.

10. Konsynski, B. R. and Warren F. McFarlan, "Information Parnerships - Shared Data, Shared Scale," *Harvard Business Review,* September-October 1990, pp.114-120.

11. Kumar, K. and H. G. Dissel. “Sustainable Collaboration: Managing Conflict and Cooperation in Interorganizational Systems,” *MIS Quarterly*, September 1996.

12. Newmann, Seev. *Strategic Information Systems: Competition Through Information Technologies*, New York: Macmillan Publishing Company Inc., 1994.

13. Rackoff, Nick, Charles Wiseman, and Walter A. Ullrich. “Information Systems for Competitive Advantage: Implementation of a Planning Process,” *MIS Quarterly*, Vol.9, No.4, December 1985.

14. Tapscott, Don and Art Caston. Paradigm Shift: The New Promise of Information Technology, New York: McGraw-Hill, Inc., 1993.

15. Wisemann, C. and I. C. Macmillan, “Creating Competitive Weapons from Information Systems,” *Journal of Business Strategy*, Fall 1984.