



The strategic changes by adopting internet-based interorganizational systems

Strategic changes

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Abstract

Purpose – The objective of this paper is to investigate the strategic changes from adopting Internet-based Interorganizational Systems (IIOS) within the logistics industry.

Design/methodology/approach – This paper reviews literature of the evolution of IIOS from Interorganizational Systems (IOS); identifies challenges encountered by the logistics industry in a new digital economy; presents an IIOS model for the logistics industry; and examines a number of strategic changes of adopting IIOS from a case study.

Findings – The paper illustrates a number of strategic changes by adopting IIOS from a case study.

Research limitations/implications – It supports the development of the IIOS model for the logistics industry; links this theoretical model into practice; and provides the direction for future research.

Practical implications – This paper is very useful for third-party logistics providers as it helps them to understand how IIOS changes the structure of the logistics industry and alters the rules of competition.

Originality/value – This study provides a contribution in practice by linking a theoretical IIOS model for the logistics industry to a practical real case.

Keywords Supply chain management, Electronic commerce, Competitive advantage

Paper type Research paper

1. Introduction

The use of interorganizational systems (IOS) has become increasingly widespread in the 1980s. The airline, financial, automobile, retail, consumer goods, cotton, health care, and grocery industries have increased the use of IOS (Cavaye, 1995; Copeland and McKenney, 1988; Hess and Kemerer, 1994; McKenney, 1995; Vitale and Konsynski, 1988; Webster, 1993). IOS changed the structure of the above industries and created strategic advantages by giving companies new ways to cooperate with their supply chains. The common purpose of IOS is to support firms' value chains, so that firms can be more competitive in the market.

IOS have increasingly emerged to support partnering among organizations. They give many companies a way of at least temporarily differentiating themselves from competition, such as handling sales transactions more efficiently (Siau, 2003). The revolution in Information Technology (IT) in the 1990s, especially the rapid growth of internet and Web services, led successful companies to radically redesign their business processes to achieve dramatic performance improvements. The electronic business systems that facilitate two or more organizations using electronic data interchange (EDI) with Internet technologies are called Internet-based Interorganizational Systems (IIOS).

The trends of globalisation and mass customisation drive the traditional single enterprise to respond and meet market demand. The new economy calls for the alliances (of a single enterprise) to be made with third-party logistics (3PL) providers in



order to form a global supply chain (Tyan *et al.*, 2003). IIOS allows 3PL providers to enhance their services and to form new partnerships. With the use of IIOS, transaction costs between partners and internal transaction costs for daily operations are reduced.

Zhu *et al.* (2006) mentioned that the applications of EDI have been studied extensively in literature but very little about the pattern of open-standard IOS adoption. Open standards, such as eXtensible Markup Language (XML), are standard data representation formats that are commonly used in Internet communication. XML is used to describe data that allows different information systems to exchange data regardless of the underlying programming language or operating system (Daniel *et al.*, 2004). IIOS are the exemplars of open-standard IOS (Chatterjee *et al.*, 2002; Zhu *et al.*, 2006). Literature in buyer–supplier relationships has addressed on transaction cost economics for reducing coordination costs. This research tries to provide a more integrative view of IIOS in supply chain strategies.

The objective of this paper is to investigate the strategic changes by adopting IIOS by the logistics industry. This paper briefly reviews the evolution of IIOS. Then, it identifies the challenges faced by the logistics industry. After that, the paper presents an IIOS model for the logistics industry. Finally, it reports the results of the case study and draws conclusions.

2. The evolution of IIOS

A number of researchers have developed various IOS frameworks. The evolution of IIOS can be divided into two separate phases. The first phase is traditional IOS that use EDI (via Value-Added Networks (VAN) or traditional EDI for data interchange to support firms' value chains. The second phase is IIOS that use XML, workflow and other internet communication technologies for EDI to support partnering among organizations as well as firms' value chains.

2.1. Traditional IOS

The concept of IOS has been around since the 1960s. Kaufman (1966) implored general managers to think beyond their own organizational boundaries to share information and information processing across organizational boundaries. The term IOS was born in the early 1980s, as Barrett and Konsynski (1982) used the term “inter-organizational information sharing system” for the first time and Cash and Konsynski (1985) first coined the term “IOS” to refer to an automated information system shared by two or more organizations. IOS offer a competitive advantage by harnessing the efficiency of electronic communication for all participants (Cash and Konsynski, 1985; Porter and Millar, 1985; Tyan *et al.*, 2003). IOS provide benefits to the host organizations by (1) building barriers to competitive entry, (2) increasing switching costs for customers, and (3) balancing of power in supplier relationships (McFarlan, 1984).

Cash and Konsynski (1985) employed telecommunications technologies to cross organizational boundaries and showed how to automate information systems shared by two or more companies. In this period, the aims of IOS implementation were cost reduction, productivity improvements, and creating product/market opportunities (Hess and Kemerer, 1994). EDI technology was employed by IOS to provide linkages between buyer and seller organizations and distribute business transactions among them (Figure 1). Traditional EDI exchanges standardized electronic documents through proprietary networks and mapping software. The introduction of EDI lowers the transaction costs by reducing paper work (Clemons and Weber, 1989). It also increases the efficiency of interorganizational communications to obtain quicker customer responses.

Traditional IOS emphasize buyer–seller relationships. Significant literature has focused on the nature of interorganizational firm-relationships (e.g. Cunningham and Tynan, 1993). Traditional EDI proved to be an effective tool in the early years of IOS. Many studies have investigated the antecedents of EDI use, and outcomes of EDI use (Hart and Saunders, 1998; Srinivasan *et al.*, 1994). Others have focused on specific forms of relationships on the effect of IT on IOS (Bakos and Brynjolfsson, 1993; Clemons and Reddi, 1993; Gurbaxani and Whang, 1991; Holland and Lockett, 1997; Malone *et al.*, 1987). Kumar *et al.* (1998) presented a typology for IOS based on interorganizational interdependence. The characteristics of three types of IOS are pooled information resource IOS, value/supply chain IOS; and networked IOS. Johnston and Vitale (1988) developed a classification framework using three dimensions: business purpose, relationships with participants, and information function. The framework takes the form of a decision tree where the three dimensions are sequentially interconnected.

Although there are many competitive advantages of implementing traditional IOS, then why does not every organization implement IOS? The primary reason is the high entry and running costs especially for small and medium size companies. To establish traditional EDI between both parties requires compatible hardware at both ends in order to have seamless processing (Clemons and Reddi, 1993). The additional costs associated with the VAN services typically fell in the range of USD5,000-6,000 per month (Bartholomew, 1997). The high costs of establishing VAN for EDI have hindered the growth of traditional IOS.

2.2. Internet-based IOS

The introduction of internet and web services has been changing electronic connections between firms. A major distinction between traditional EDI and IIOS is their delivery platform and communication protocols: private VAN vs Internet VAN (Zhu *et al.*, 2006). Figure 2 illustrates the communication platforms of IOS and IIOS. The cost of internet communication is significantly lower than that of private VAN (Cai *et al.*, 2006). Internet provides a low-cost alternative to private VAN for data exchange. Increasingly, companies have or plan to adopt IIOS. Therefore, IOS research is being migrated from traditional EDI to IIOS.

Grossman (2004) defined IIOS as internet-based information systems shared by two or more organizations, such as extranets, virtual corporation, internet-based EDI, and business-to-business electronic commerce (B2B commerce). IIOS participants are not only buyers and sellers, but also include affinity organizations or competitors. IOS supported the automation of manual processes, IIOS enhance a range of new features

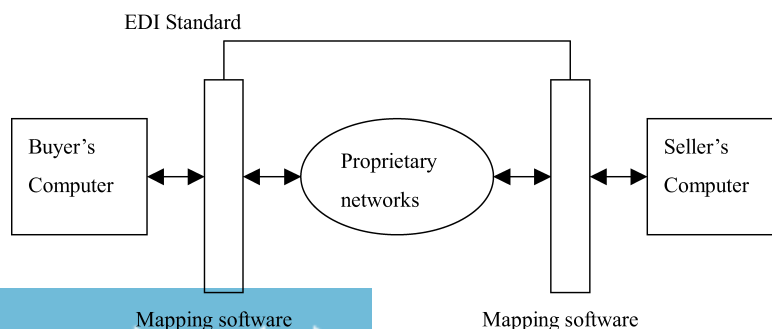


Figure 1.
EDI data flows

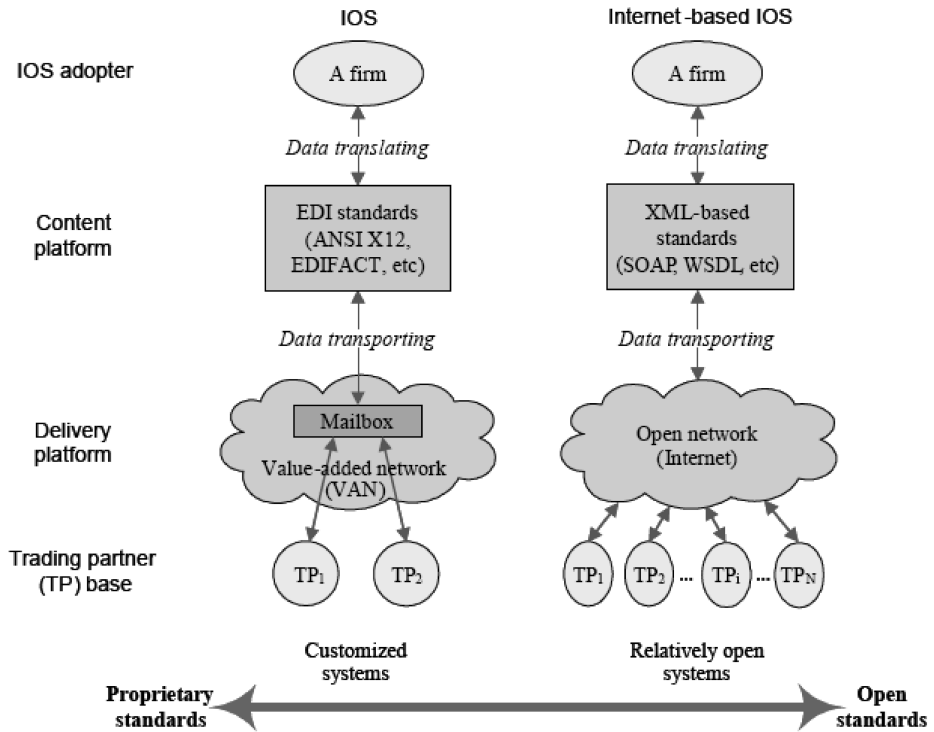


Figure 2.
Communication platforms
of IOS and IIOS

Source: Zhu *et al.*, 2006

for information sharing, communication, and collaboration (Icasati-Johanson and Fleck, 2003). New interorganizational forms, such as outsourcing, partnerships, strategic alliances, and networked organizations are created between independent organizations in several industries (Ring and Van de Ven, 1994). IIOS tend to increase as the number of system participants grows. Electronic marketplaces provide linkages between participants in horizontal and vertical linkages (Gurbaxani and Whang, 1991). The linkage between heterogeneous value chains is vertical, whereas the linkage between firms spanning a single industry is horizontal. Depending on the interaction patterns between the participants, IIOS can be configured in three ways: one-to-one, one-to-many, and many-to-many. With different system support levels (operational and strategic supports) different organizations may configure their IIOS in different linkages and different ways. IIOS involve that all participating members coordinate their efforts and cooperate with each other (Lee *et al.*, 2005).

For operational support level, IIOS are primarily designed for supporting routine operations (Hong, 2002). Firms are connected to share their information as part of their day-to-day business to support a value or supply chain through the internet. For strategic support levels, IIOS are designed to provide resource-oriented cooperation that includes exploitation of the economies of scale in operations and transaction costs (Gurbaxani and Whang, 1991).

IIOS may be classified into either electronic market or electronic hierarchy. Electronic market is designed to match buyers and sellers who generally do not share a

long-term relationship. Under electronic hierarchy, the organizations involved share a long-term relationship and align their internal processes with one another (Lewis, 2001). IIOS change the structure of various industries and create competitive advantages and strategic necessity by giving companies new ways to cooperate with their supply chains.

3. The logistics industry

3.1 3PL providers

The mission of a 3PL provider is to help its customers by taking care of their logistics functions. 3PL providers provide a wide range of integrative supply chain services such as warehousing, transportation, customer service, and logistics management. The development of 3PL industry consists of three waves (Berglund *et al.*, 1999). In the 1980s, traditional 3PL providers' competency centred on effective transportation and warehousing. From the early 1990s, a number of international network players started their logistics activities, such as DHL, TNT, and FedEx. In the late 1990s, 3PL providers provided comprehensive range of innovative logistics solutions by integrating their participants by the use of IT and IOS.

In this later period, a number of firms were combining domestic and international sourcing through global supply chains as a means of achieving a sustainable competitive advantage (Bozarth *et al.*, 1998). Firms can better focus on their core business, such as manufacturing and retailing, by outsourcing their logistics activities to 3PL providers. Such outsourcing means that firms whose core competencies lie elsewhere can concentrate on activities best managed internally and gain access to superior logistics performance at equal or lower cost (Bowersox and Daugherty, 1995; Hamel and Prahalad, 1994; Micklethwait and Wooldrige, 1997; Pint and Baldwin, 1997).

Logistics outsourcing is defined as the use of a 3PL provider in a specified contractual relationship, in the execution of all or part of the organizations logistics operations (Bolumole, 2001; Lambert *et al.*, 1999; Maltz and Ellram, 2000). The growth in just-in-time, manufacturing focused on reduced inventories and frequent replenishment, has increased the need to handle small shipment. Large US manufacturers paid 33 per cent of their annual logistics operating budget to 3PL providers in 2003 (Lieb and Bentz, 2004). These were 24 per cent in 2002 and 19 per cent in 2001. The growth in e-commerce has resulted in a decrease in shipment sizes and growth in home delivery. Jaffe *et al.* (2001) predicted that the outsourcing market for 3PL would rise from US\$8.6 billion in 2002 to \$29.2 billion in 2005 in China, Singapore, and Malaysia. Therefore, there is a continuous growth in the use of logistics outsourcing.

Today, 3PL providers should be aware of the changing market needs in today's logistics market. A 3PL provider can create organizational and customer value by differentiating its logistics services from competitors (Panayides, 2004). Therefore, 3PL providers have become specialists through differentiation, and the scope of services encompassing a variety of options ranging from limited services, e.g. transportation, to broad activities covering the full spectrum of a supply chain and operating across international borders (Sohail *et al.*, 2004). Thus, 3PL providers consider employ IIOS as a source of strategic issues.

3.2 A proposed model of IIOS for the logistics industry

The application of IOS in the 3PL industry is not new. Barrett and Konsynski (1982) identified that the essential requirement for an IOS is a computer-based, electronic link

between two or more members of a supply chain. This link automates some elements of the logistics workload, such as order processing, order status inquiries, inventory management, or shipment tracking.

Recently, e-commerce eliminates some traditional intermediaries and changes the role of existing intermediaries. 3PL providers, such as warehouses or transportation carriers, not only to execute logistics activities as physical intermediaries, but also support information processing activities as information intermediaries. For example, a manufacturer (shipper) which partners with a 3PL provider can distinguish itself by allowing its buyer (consignee) to check the shipping status through their systems. The relationship between a 3PL provider (e.g. airfreight forwarder) and its suppliers (e.g. airlines) can take the form of an electronic hierarchy. In this study, an IIOS model for the logistics industry is proposed. The model is extended from Hong's (2002) IOS framework. In this framework IOS are classified into four types based on the role linkage of the IOS participants: resource pooling; complementary cooperation; operational cooperation; and operational coordination (Figure 3). The IIOS model for the logistics industry provides an illustration of the emerging structure for physical flow of goods and information flows associated with 3PL provider and its up-stream and down-stream alliances (Figure 4). IIOS provide vertical linkages to facilitate information flows between shippers and consignees. This link supports daily operational coordination and improves the buyer–seller relationship in a supply chain. IIOS also provide horizontal linkages to coordinate logistics activities among other 3PL providers. This link facilitates operational cooperation and improves customer services. Therefore, IIOS enable 3PL providers to exchange information among their clients and partners to support their day-to-day business in a supply chain. This kind of partnership may lead to supply chain competitive advantages and strategic cooperation. A case study is performed to explore the strategic changes by adopting IIOS in the logistics industry.

4. Methodology

Elgarah *et al.* (2005) have searched all referred articles from 1993 through 2002 on the topic of EDI, interorganizational relationship, and IOS. Only 15 per cent were found to be strategy related based on an examination of 68 articles from 34 journals. They identified conceptual gaps and suggested future research in the area which can lead to major structural changes in the organizations as level of integration increases with time.

Role linkage Horizontal Vertical	Operational Cooperation - Joint DB (information sharing) - Improved customer service	Resource Pooling - Joint IT construction (cost/risk sharing) - Market coalition
	Operational Coordination - Value/supply chain support (buyer-seller relationship)	Complementary Cooperation - Integrated products/services (join marketing)
	Operational support	Strategic support

System Support Level

Figure 3.
A framework for IOS

Source: Hong, 2002

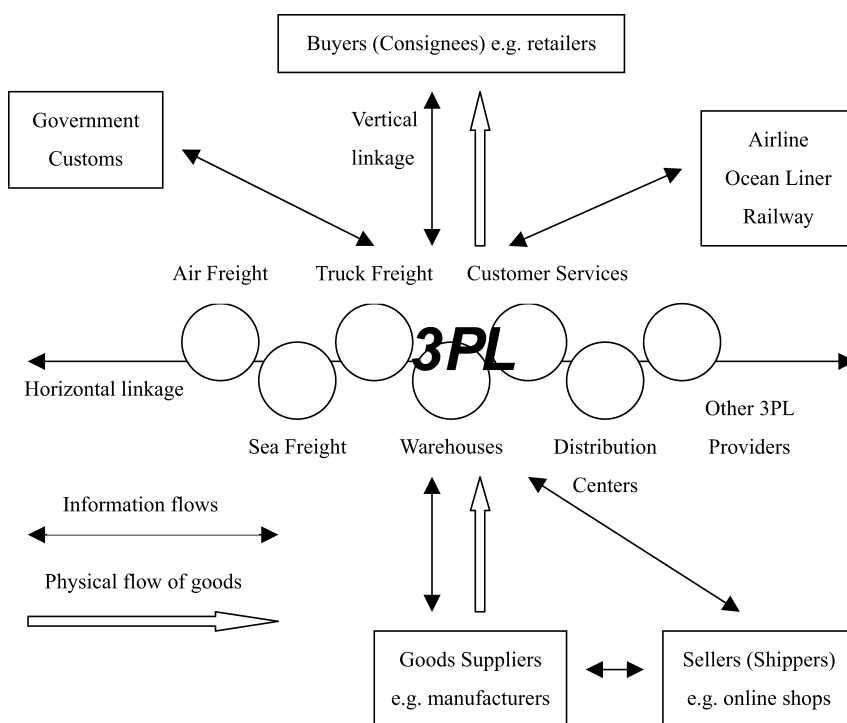


Figure 4.
IIOS model for the logistics industry

There are two related research objectives of this study. The first is to investigate an IIOS model for the logistics industry. The second is to identify the strategic changes of adopting IIOS within the logistics industry. A case study was used to answer “what are the strategic changes of adopting IIOS within the logistics industry?” Yin (1988) stated that when a “what” research question is asked and an exploratory study is contemplated, an embedded case study design is appropriate. Semi-structured interviews were conducted to collect the data from four senior managers of the case company. Kerlinger (1986) stated that semi-structured interviews are appropriate to gain in-depth exploration into ideas and relationships not initially considered.

5. Case study

5.1 Backgrounds

BEL international logistics ltd. is one of the leading international freight forwarders in the logistics industry. This case study company was established in 1978. It is one of the leading freight forwarders in Hong Kong which provides airfreight, sea-freight, and intermodal forwarding services. In 2006, BEL achieved the Top Agent Award from Cathay Pacific Airways, Malaysia Airlines, and Dragon Air. Its mission is to provide seamless and expertly services to its valuable customers and as well of its global partners. To cater with the innovation and revolution in the new century, BEL paid a lot of effort to streamline itself to cope with customers’ global expending needs.

BEL provides a broad range of cargo forwarding services that cover diverse commodities to and from countries around the world. It provides daily airfreight consolidation services and full pallet shipment to and from major international

airports. It also offers a diversified range of ocean freight forwarding and consolidation service shipment to and from major ports in worldwide. In Hong Kong, BEL has modern and professional logistics warehouses with 25,000 square foot and 15,000 square foot of docking area to provide effectively inbound, outbound, and inventory management operations. BEL has extended its business over all major cities in China such as Beijing, Shanghai, Tianjin, Dalian, Xiamen, Guangzhou, Shenzhen, etc. Its China offices network leads in the transportation between Hong Kong, China, and overseas.

5.2 The infrastructure of IIOS

In order to compete, BEL continuously invests in its IT capabilities. In 2005 BEL implemented its IIOS, which enhanced its daily operations efficiency and communication through Internet network. Its IIOS consists of an airfreight forwarding management system, an ocean freight management system, an air-ocean intermodal management system, an online cargo tracking system, and an accounting system. In coming years its IT team will complete its warehouse management system and start to develop its fleet management system. Figure 5 shows the infrastructure of its IIOS. Its IIOS are connected to major airlines and shipping lines for daily bookings, operations, and tracking. Its IIOS also support traditional EDI and XML interfaces to provide data interchange with its business partners. Moreover, customers can input shipping order and trace shipping status through BELs company portal.

5.3 The structure of the IIOS

BEL has been implementing its IIOS since 2003. The project is still in progress. Initially top management of BEL treated it as an IT project. The IT manager had spent a half

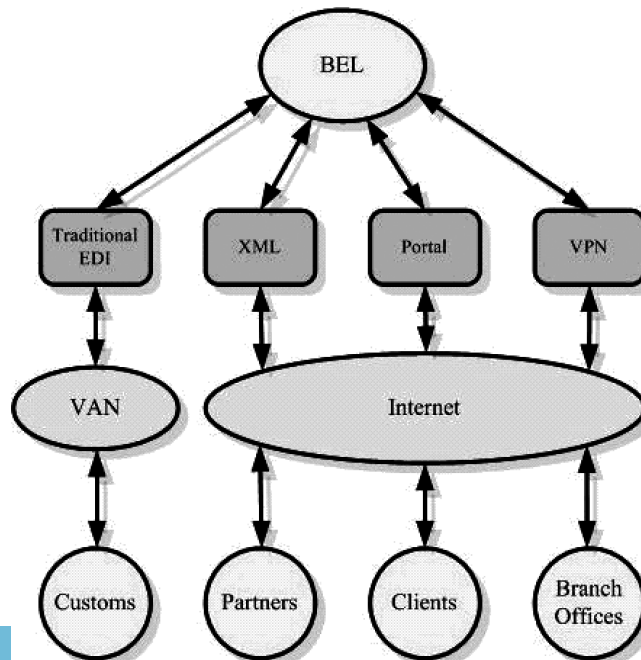


Figure 5.
Infrastructure of IIOS

year to gather system requirements with each party/department. The result was not very satisfying, since everyone was solely concerned on their specific and current tasks within the company. They lacked a sense of interorganizational cooperation and collaboration. Therefore, BEL hired an external consultant to manage this project at the beginning of 2004. After conducting a requirement analysis, the design of its IIOS consisted of four parts (Table I).

The first part consists of airfreight management, sea freight management, air-ocean intermodal management, and accounting systems. The accounting system is for the intra-organization (Chinese branch offices). Other systems provide horizontal linkage to share shipping information with local and overseas business partners. The second part is an online tracking system. Shippers and consignees can track and trace their shipping status. It provides vertical linkage to share shipping information with shippers and consignees. The third and fourth parts are under development. The third part contains a warehouse management and fleet management system. BEL is competitive on freight forwarding services by means of airfreight, sea freight, and sea-air freight. The third part of the IIOS development is catering for their business development on truck transport and distribution. BEL has its own trucking system (mainly for Hong Kong), but it is also outsourcing their trucking services to other trucking firms (mainly for the remainder of China). The fleet management system enables BEL to plan their truck routing with other trucking firms. BEL has its own warehouse in Hong Kong. The warehouse management system is integrated with an online tracking system. Therefore, customers can manage their inventories through the online tracking system. The fourth part of the IIOS is the extension of an online tracking system. It provides XML and Web services interfaces to connect shippers and consignees' systems. Therefore, shippers and consignees can place shipping order, track and trace shipping status, manage inventory, and release delivery order through their own systems.

5.4 Strategic changes

BEL believed that IIOS are necessary for doing 3PL business in the future. IIOS provide vertical linkages to facilitate information flows between sellers, buyers, and goods suppliers, and provide horizontal linkage to align strategic partners on specific

	Linkage	System	Interface
First part	Horizontal linkage	(1) Airfreight forwarding management system (2) Ocean freight forwarding management system (3) Air-ocean intermodal management system (4) Accounting system	XML and Web services VPN
Second part	Vertical linkage	(5) Online cargo tracking system	Portal
Third part (under development)	Horizontal linkage	(6) Warehouse management system (7) Fleet management system	XML and Web services
Fourth part (under development)	Vertical linkage	(8) Online data interfaces	XML and Web services

Table I.
The linkages and interfaces of BEL's IIOS

business functions or processes. The vertical linkage benefits process automation and aims at saving time and costs. The horizontal linkage helps to achieve strategic goals and have the potential to transform entire businesses. BEL recognized the adoption of IIOS leading to following strategic changes:

5.4.1 Extended the roles of logistics services. In Hong Kong, although 3PL providers claim themselves as providers of a comprehensive range of logistics services, most of them are forwarder based suppliers. In the high competitive business environment, firms recognize the strategic value of having timely and accurate logistics information. IIOS enable logistics information flows among members in a supply chain. After adopting IIOS, BEL has extended its middleman forwarder role into a newer information based logistics provider which provide electronic logistics services such as electronic booking, tracking, tracing, and monitoring.

5.4.2 Alters the rules of competition. IIOS, which change the structure of BEL, alters the rules of its competition. The traditional structure of the logistics industry is isolation through intermediaries (Lewis and Talalayevsky, 2000). IIOS allow flexible, non-hierarchical communications among participants. IIOS facilitate BEL to outsource its up-stream and down-stream logistics functions to its horizontal alliances. Therefore, BEL can collaborate with other 3PL providers and provides inter-modal transportation and complete logistics solution to its client organizations. The new structure of BEL aligns horizontal business partners together to compete with large 3PL providers.

5.4.3 New ways to cooperate with clients. IIOS provide new ways for BEL to cooperate and compete with its rivals. IIOS provide competitive advantages on acceleration of information flows among participants and effective use of this information for business operations and analysis. Under IIOS, the relationship between BEL and its client firms is like a centralized electronic market structure. Through the IIOS, clients can obtain very timely information to organize and monitor their logistics activities. IIOS provide effective management of buyer-supplier relationships (Monczka *et al.*, 1994; Tan, 2001). Furthermore, IIOS support data integration between BEL and its clients' systems. IIOS expand information flows in supply chain to create more efficient supply chain process. This efficient supply chain process enables BEL to bind its clients tightly.

5.4.4 Help partners with the competition. Under the IIOS, interaction between BEL and its horizontal partners is more fully connected in an electronic hierarchy structure. The information flows between horizontal alliances reduce BEL and its partners' operation costs and provide prompt response within the business environment. The sharing of client information by horizontal alliances provides a powerful means of increasing the market scope. Therefore, BEL and its partners can forecast the demand of logistics services in coming period, so they can plan operations, reduce market risks, migrate to new market, and develop successful business strategies. This kind of cooperation enables BEL to help its partners with the competition.

5.4.5 Spawn a new business model. IIOS spawn a new business model. Today, BEL only provides services for portions of the total logistics function. IIOS lead to the emergence of a new business model by allowing BEL to extend its existing operations to a total logistics solution. In the future, BEL plans to provide all kinds of logistics services, such as distribution centre and vendor management inventory services. Therefore, BEL can be survived in the high competitive logistics industry in the future.

Shang *et al.* (2005) stated that Internet EDI differs from traditional EDI in the de facto standard, flexibility to add and change business partners, and lower cost. But this case study reflected that business partners become locked into the systems due to high

switching costs. IIOS affect business partners' ability to change not only their systems but also their business strategies. Therefore, the adoption of IIOS is a strategic issue. BEL developed its IIOS as a strategic tool to bind its clients and business partners in their supply chain networks.

5.5 Implications

Zhu *et al.* (2006) stated that the one of the expected benefits of IIOS adoption is to help improve value chain coordination. Manufacturers and retailers outsource their logistics activities to 3PL providers. 3PL providers become an important party in a value chain. The case study provides an example of how IIOS are employed for a 3PL provider to organize its logistics activities for their clients (manufacturers and retailers). On the other hand, the case study also provides example of how IIOS are used for 3PL provider to coordinate their logistics with business partners. This study provides 3PL provider an IIOS model that helps to improve the value chain coordination.

A majority of the studies are of the survey nature using single cross-sectional snapshots, the emphasis appears to be on short-term outcomes of EDI-enabled relationships (Elgarah *et al.*, 2005). Transaction cost economics has been the dominant theoretical lens in evaluating the impact of IOS (Saeed *et al.*, 2005). This study focuses on a strategically related area rather than process efficiency and cost reduction; and it shows the strategic changes by the adoption of IIOS in the logistics industry. The case study provides evidence that BEL extends its roles of logistics services (from single airfreight service to all-in-one logistics solution); cooperates and competes with rivals (by increasing the market scope); and spawns whole new internet-enabled collaborative strategies (to bind clients and business partners into its internet-enabled collaborative networks).

Elgarah *et al.* (2005) stated that managers should prepare their organization's strategies to better capitalize on the new trends and to understand the implications such change to their organizations. This case study demonstrated how BEL plans its IIOS development to adopt the new trend of internet-enabled collaboration in a supply chain.

5.6 Limitations

There are some limitations in this study. The data were collected from one local 3PL provider which mainly provides airfreight service. This limits the generalizability of the results to other logistics firms. The data were collected through semi-structured interviews with four senior managers of the same organization. Multiple case studies of different logistics firms could be conducted to provide more accurate and generalizable results. Another limitation is the focus of the study. This research studied the results of IIOS adoption. Future research could be considered to examine the technical and social issues in the implementation of IIOS on logistics industry.

6. Conclusion

The internet is an economical means of electronic communication between organizations. The introduction of IIOS for the logistics industry is changing the way electronic connections between shippers, consignees, carriers, government, and business alliances are structured and operated. This study examines the model of IIOS within the logistics industry. IIOS provide vertical linkages to facilitate information flows between shippers and consignees. The vertical linkage benefits process automation and aims at saving time and cost. IIOS also provide horizontal linkages to

align business partners on specific logistics functions or processes. The horizontal linkage helps to achieve strategic goals and has the potential to transform entire businesses. The case study shows how IIOS create strategic changes by using IIOS to extend their roles of logistics services; cooperate and compete with their rivals; and spawn whole new internet-enabled collaborative strategies. This paper shows how IIOS changes the structure of a 3PL provider and alters the rules of competition; create strategic advantages by giving 3PL provider new ways to cooperate and compete with its rivals; and spawn a new business model, often from within a 3PL provider's existing operations.

IIOS are a strategic necessity for doing business in the logistics industry. However, the implementation of IIOS requires the cooperation of all participants. Future work is proposed to examine the technical and social issues in the implementation of IIOS on the logistics industry and provide some suggestions that can be employed to overcome these problems. Future research will be continued to follow the structural changes of BEL and its business partners as level of integration increases with time.

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