THE SUPPLIER-BUYER RELATIONSHIP IN THE ELECTRONIC BUSINESS CONTEXT

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Abstract

The e-business revolution is going beyond a technology change. E-business refers to the way of doing business electronically. Implementation of e-business in the supply chain is not only the realization of a technology change but also a process of organizational change. Different implementation phases reflect increasing levels of complexity in terms of technical implementation, process changes and trading partner relationships. The relationships between buyers and suppliers have received considerable attention in recent years. Traditionally, buyer-supplier relationships were considered as adversarial, arm's-length transactions. However, this relationship is moving towards a more collaborative approach.

This paper explores the enabling role of electronic business in maintaining different types of supplier-buyer relationships (SBR). Using information to support supply chain management requires integration of different types of information. An understanding of how electronic business can be deployed by firms to exchange information and to maintain and build relationships is important. We propose a two-dimension framework that can be used in assessing the relationship of supply chain to e-business: the means of communication (different types of electronic business applications) and the type of information being exchanged (operational or strategic approach).

The framework positions three levels of e-business initiatives according to the degree of information integrated into the supply chain management process. This conceptual model of supply chain relationships is proposed, not as a definite taxonomy of interdependence, but as a framework built around common obstacles that captures some of the transition difficulties from one level of interdependence to another, with investment in e-business technology. The framework suggests three possible alternatives for developing and maintaining supplier/buyer relationships in the context of the integration of e-business into business processes, including (1) step-by-step formulation, (2) quick build up and (3) adaptation.

When there is a balanced power relationship between two trading partners and they both have a high level of organizational readiness for EDI, this quick build up strategy is likely to be the most appropriate choice. However, small companies may prefer an adaptation strategy, which represents the evolutionary stages of e-business application. The step-by-step formulation seems to be suitable for many companies especially when they have little or no e-business experience. This approach can offer the firm sufficient time to adapt itself to this new information technology and to restructure its business practices and applications.

The two dimensions of electronic business will be very useful in deriving strategy to formulate and maintain supplier-buyer relationships. The company's management should align its business strategy with these two dimensions of e-business systems in order to get a "sustainable relationship" with their suppliers/ distributors.

1. Introduction

The relationships between buyers and suppliers have received considerable attention in recent years. Traditionally, buyer-supplier relationships were considered as adversarial, arm's-length transactions [1]. However, this relationship is moving towards a more collaborative approach. Many manufacturers recognize that their ability to compete at world-class status is based to a great degree on their ability to establish high levels of trust and cooperation with their suppliers.

The increase in global competition has given managers the impetus to develop innovative relationships in the distribution channel. In the business-to-business (B2B) e-commerce environment, inter-organizational information systems such as Electronic Data Interchange (EDI) have been used to link one or more firms to their customers or suppliers through private value-added networks. EDI companies are shifting their focus towards web-based B2B solutions in response to the emergence of internet applications. The merge between traditional EDI and the internet has provided many opportunities for business transactions and information exchange.

Using information to support supply chain management requires integration of different types of information. EDI alone cannot support a wide variety of information sources such as image, video and voice. This flexibility requires EDI communication to be used in conjunction with the varied technologies of electronic commerce such as e-mail, file transfer, fax, electronic catalogues, video conferencing, etc. [2].

Wilson and Vlosky [3] found that the lack of communication and coordination in all stages of technology implementation in channels is a major source of friction between buyers and suppliers, causing the interorganizational information system (IOS) impacted relationship to suffer in the short term. In the long term, however, relationship-satisfaction is often re-established at or above pre-IOS technology adoption levels as both parties realize economic gain and competitive advantage [4].

This paper explores the enabling role of e-business in formulating different types of supplier-buyer relationships (SBR). Using information to support supply chain management requires integration of different types of information. An understanding of how e-business can be deployed by firms to exchange information and to maintain and build relationships is important. We propose two dimensions that can be used in assessing the supply chain relationship to e-business: the means of communication (different type of electronic business applications) and type of information being exchanged (operational or strategic approach).

2. Supplier – buyer relationship

There are two major types of relationships between buyer and suppliers as defined by most researchers: "adversarial competitive" and "collaborative partnership". Robert and Mackay [5] argues that the primary goal of the traditional adversarial approach is to minimize the price of purchased goods and services. The approach is dependent on three major activities:

- (1) The buyer relies on a large number of suppliers who can be played off against each other to gain price concessions and ensure continuity of supply.
- (2) The buyer allocates amounts to suppliers to keep them in line.
- (3) The buyer assumes an arm's-length posture and uses only short-term contracts.

This type of relationship was used mainly until the late 1980s in an arm's length mode [1]. It is adversarial in the sense that both buyers and suppliers try to achieve a profitable deal at the other's expense. When such relationships are engaged, the buyer relies on a large number of suppliers and uses only short-term contracts in order to obtain a higher bargaining position compared to that of other suppliers.

Spekman et al [6] detailed the transition from open market negotiation to collaboration. This paper placed particular emphasis on how to move from co-operation to collaboration within a supply chain. Co-operation, where firms exchange bits of essential information and engage some suppliers/customers in long term contracts, is the starting point for supply chain management. The co-ordination provides both workflows and information exchanges in a manner that permits JIT systems, EDI and other mechanisms to be linked.



Figure 1. Type of supply chain relationships Source: [6]

Collaborative relationships require trust and commitment for long-term cooperation along with a willingness to share risks. Therefore, the effective formation of collaboration ventures requires efficient communication at all levels, open information sharing and continuous inter- and intra-improvements. Ellram [7] combined a literature review with the use of case studies of firms involved in buyer-supplier partnerships to determine those factors that should be considered in the selection of supply partners. Four categories were identified, namely:

- (1) Financial issues;
- (2) Organizational culture and strategy;
- (3) Technology; and
- (4) Miscellaneous factors.

The issues included in these categories tend to be longer term and more qualitative than factors included in traditional supplier selection models. These additional factors are suggested to supplement, rather than to replace, the more traditional factors in developing strategic partnerships with suppliers. Segev and Gebauer [1] extended the supplier-buyer relationship to five stages: (1) vendor; (2) traditional supplier/buyers; (3) certified suppliers; (4) partnership type relationships and (5) strategic alliance.

Arm's length relationship			Collaborative relationship	
Vendor	Traditional	Certified Suppliers	Partnership type	Strategic alliance

Figure 2. Type of supplier relationships Source: [1]

In this paper, Segev et al. [1] placed particular emphasis on the impact of e-business in the area of indirect procurement. The findings indicated that the direct procurement context has been the catalyst to the dramatic development in B2B e-commerce.

3. Electronic business application

Electronic commerce (e-commerce) is about the use of information technology (IT) for the support of business transactions. Business transactions can be, for example, pre-sale activities, sale process, purchases, finance and insurance, placing an order, delivery and payment, etc. The applications that support these transactions can be categorized broadly into two major groups [8], [1]:

- (1) Business-to-consumer (B2C) transactions: examples are electronic retailing, consumer good and electronic payment.
- (2) Business-to-business (B2B) transactions: an example is a company that uses a network for ordering from its suppliers, receiving invoice and making payment. The objective of B2B e-commerce is to eliminate manual

trading processes by allowing internal information systems of different companies to directly exchange information. Therefore, inter-organizational systems, such as EDI, are required [8].

Harrison and Samson [9] describe e-business as a three-phase process, including providing information, B2C and B2B. The authors assert that, at the B2B level, the impact of the e-business model can go beyond the enterprise level, bringing about far reaching effects in the entire industry as all firms struggle to reach newly established thresholds of a competency.

Suppliers and manufacturers using EDI systems could be partitioned into three distinct groups [10]:

- (1) those who receive e-business documents/purchasing orders via fax;
- (2) those who receive EDI transmission immediately upon receipt; and
- (3) those who receive EDI transmissions with the capability of reading the transmissions into the order entry system and/or other computer applications.

B2B e-commerce technologies provide effective and efficient ways in which corporate buyers can gather information rapidly about available products and services, evaluate and negotiate with suppliers, implement order fulfillment over communications links, and access post-sales services. The objective of B2B e-commerce is to eliminate manual trading processes by allowing internal information systems of different companies to directly exchange information. Therefore, inter-organizational information system integration is required [8]. B2B e-commerce encompasses a wide range of business operations and transactions among the involved parties, for instance (1) the establishment of an initial contact between a potential consumer and potential supplier; (2) the delivery and exchange of information; (3) pre- and post-sales support; (4) contract negotiation; (5) electronic payment; (6) distribution and distribution management of goods.

The backbone of these systems has traditionally been EDI systems. EDI assists supply chain management by linking inventory, billing, shipping to customers and suppliers, and conducting payment procedures. Using information technology to support supply chain management (SCM) requires integration between different types of electronic information. Where there is a lower level of structure or greater diversity of content such as image, video and voice, there is a need for a more flexible medium of communication than that offered by a structured format like EDI [5]. Electronic business therefore needs to be viewed in the context of its impact in enabling business process redesign, the opportunities it offers to exploiting in its formation, the challenge of integration within internal systems and its implementation through supporting technologies and application [11].

Web- and internet-based applications provide a cost-effective way to automate the exchange of structured and unstructured documents between trading partners. The merge between traditional EDI systems and eXtensible Markup Language (XML) provides a standard framework to exchange different type of data. XML/EDI enables information exchange via Application Program Interface (API), web automation, and database portal. Distinguishing characteristics include an investment in systems and organizational infrastructure in order to participate, and the volume of business required to justifying the investment [12]. Inter-organizational information systems (IOS) systems, such as EDI are said to have little to offer in terms of end-user interaction and support. But with the advent of web-based application, e-business has now grown from simply handling transaction data to supporting all forms of information exchanges; including procurement transactions, supply chain management, sourcing information, new product development, shared electronic mail, etc.

4. The rationale of e-business to supplier/ buyer relationships

Research in this area during the late 1980s and 1990s describe the benefits an organization can expect to gain from adopting EDI [13], [14]. The major focus of the research was that benefits automatically flowed from adopting EDI and IOS systems. Recently, Walton et al [10] examined the benefits of such adoption under two dimensions: direct and indirect benefits. However, they provided little evidence to support how such systems may lead to changes in business process and suppliers/buyers relationships.

The best known "problem" in supply chains is the bullwhip effect [15]. The authors assert that irregularities and unpredictability in order quantities increase with the number of layers in the chain. This is a result of information transferred in the form of sequential orders being distorted and misguiding upstream supply chain members in their production and inventory decisions. The bullwhip effect can be experienced not only upstream in the supply chain but also downstream. Research has indicated that accuracy of information flows is an important element of the supply chain [16].

Many types of information and telecommunication technology have been used widely in supply chains to reduce the bullwhip effect, such as EDI and more recently, the internet. However, it is observed that many companies have adopted technology like EDI, often with results inconsistent with their expectations [10]. In these instances, the answer probably has more to do with management solutions than technology [17].

5. Objectives of this paper

This paper lays the basis on which to analyze supplier-buyer relationships in the electronic business context among a diverse group of manufacturers. We place particular interest on internet-based EDI systems, as it encompasses great opportunities for many businesses. A classification scheme of supplier/buyer relationships is developed, based on Electronic Business Initiatives (EBI) and the information being exchanged. Then we propose three approaches for the management of supplier-buyer relationships in the e-business context.

6. Research model

The e-business revolution is going beyond a technology change. As seen before, e-business refers to the way of doing business electronically. Implementation of e-business in the supply chain is not only the realization of a technology change but also a process of organizational change. Different implementation phases reflect increasing levels of complexity in terms of technical implementation, process changes and trading partner relationships [5].

We view the two major challenges in management of supply chain relationship as the kind information presented and how to use it. We propose two dimensions that can be used in assessing the supply chain relationship to e-business: the means of communication (different type of electronic business applications) and the type of information being exchanged (operational or strategic approach). A company may experience different types of communication and information technology such as telephone, fax and the internet for their business activities. However, the company's management should align their expected benefits from the adoption of the new technology according to the level of integration of the technology into business process. For example, studies have found EDI connectivity alone is not sufficient to generate substantial savings and organizational changes necessary [18]. The rate at which internet-based applications will be used will depend on business priorities and the progress of technical development and appropriate standards. While EDI and Value Added Network (VAN) applications are suited to deliver structured messages such as orders, invoices and inventories information, the internet and web-applications are able to deal with wider variety of unstructured and structured messages.

6.1 Electronic business initiatives

In the manufacturing context, we propose three stages of B2B transactions as follows:

- (1) **Providing information** [9]: This phase presents the stage when e-business practices were used primarily for providing trading partners with information on products or services through channels such as e-mail, web browser and shared database. The purpose of these e-business initiatives is to set up a workable network of suppliers and distributors. We are interested in how companies describe the network structure of business-to-business applications and they could include the following [1]:
 - a. Bilateral connection between us and one of our suppliers/buyers
 - b. Multiple connection between us and several of our suppliers/distributors
 - c. Connecting one of our suppliers/buyers with several of its customers
 - d. Part of a larger network.

This level has been described as providing information [9], assessing information for supplier/ buyer selections [5], technology supported document transmission [18] and classified as the "green" group for commodity products, low risk, many potential suppliers and market driven [5]. In our proposed study, we will concentrate on the extent a firm deploys the following combination of technologies to support network formulation:

- a. Traditional communication channel such as telephone, fax, paper.
- b. Email/ Internet
- c. Electronic Data Interchange
- (2) Information sharing and joint operations [19]: This stage of e-business initiatives supports information sharing and improves the degree of collaboration within the supply chain network. It is largely dependent upon the extent to which a company should be prepared to trust its trading partners with this depth of information [6]. The major concerns of this process are security, the standard of business document and procedures that are easy to use.

Once partners share information and come to common solutions, they will move to more active forms of collaboration through common deployment and implementation [19]. To help meet the challenges associated with delivering high quality products in a timely, cost-effective manner, organizations increasingly evaluate how they manage their supply chain practices. Increasingly, firms have embraced the concepts of supply base management, hoping to reduce costs by cutting inventory and improving efficiency throughout the supply chain [20]. This level indicates joint operations among supply chain members in order to reduce redundancies and leverage the cost of the whole supply chain. Models for ordering like Continuous Replenishment Planning (CRP) and Efficient Consumer Response (ECR) not only offered much greater interdependence between firms in the industry, but also enabled dramatic improvements in channel efficiency [18]. EDI was also considered as a backbone for these e-business models. In our proposed study, we will examine the importance of the following functionalities within a business unit (source: adapted from [1], [5], [19]):

- a. Transferring data electronically
- b. Making orders/trace/change orders online
- c. Accessing the supplier's internal data
- d. Giving suppliers/buyers access to our internal data
- e. JIT replenishment and quick response in place
- f. Joint planning and problem solving
- g. Applying total cost approach

(3) **Integration into business processes:** By this stage, companies in the supply chain focus on profit optimization instead of only cost reductions. They tend to have benefit relocation [11] and share risks and rewards [19]. At this level, senior managers in both companies establish close relationships based on mutual trust, and become willing to disclose sensitive and proprietary information which, when used correctly, benefits the overall channel [18].

At this level of SCM integration, firms behave as if they have joint equity ownership of the channel, seeking to maximize joint profit. Here, high levels of investment technology, such as EDI systems, have increased the switching cost among supply chain partners, which could avoid opportunistic behavior. Advanced technology such as video-conferencing and other technical data process could help supply chain partners exchange more strategic and confidential information [5]. In our proposed study, we will address the extent to which a firm integrates B2B application into its supply chain process:

- a. JIT replenishment and quick response systems are in place
- b. Inventory, production control and accounting systems are integrated by B2B applications.
- c. File transfer technical data
- d. Joint development with a new scheme for profit allocation and risk sharing

6.2 Type of information exchange

Hoek [17] analysed the case of Amazon using information within its supply chains. The research indicated that the two basic problems with the Amazon supply chain are its partial, as opposed to integral, supply chain scope and its operational, as opposed to strategic, approach to information in the supply chain. He pointed out an example, when Amazon's supply chain used sales information partially within its logistics operation, but not throughout the entire supply chain. The use of information here was mainly operational in nature – it was used to organize shipments, order products, etc. The author suggested that the more advanced strategic utilization of the information in the supply chain would help the company attain a better supply chain performance.

In this study, we propose three types of information to be used in supply chains.

- (1) **Connectivity**: This type of information provides a company with the basic information on product specification, type of services and supplier/distributor selection criteria. This information could be in paper or catalogue form. This information is useful for setting up a network of supply chain partners. In this study, we address the extent to which a firm deploys internet-based systems with the purpose of [1]:
 - a. Searching for products/catalogues
 - b. Downloading product information, and
 - c. Obtaining selection criteria and company details
- (2) **Information for operational purposes**: This includes, for example, information about orders, invoice, inventory position, etc. In the proposed study, we will address the extent to which a firm exchanges the following information with suppliers/buyers:
 - a. Materials and inventory position
 - b. Product availability
 - c. Price information
 - d. Purchase orders and changes (if applicable)
 - e. Vendor receipt/acceptance
 - f. Invoice payment
 - g. Status reporting

- (3) **Information for strategic purposes**: Document conferencing, secure tendering, financial related information, technical data, etc. In this study, we address the extent to which a firm deploys internet-based systems to exchange:
 - a. Demand forecast
 - b. Invoice payment
 - c. Technical data, product innovation
 - d. Business plan



Figure 3. Supplier buyer relationship in electronic business context

(Adapted from [5], [21])

The model in Figure 3 describes how the supplier/buyer relationship is related to different levels of e-business initiatives and information exchange. The logic behind that is how the focal company uses the internet and e-business applications for their information exchange and to which extent this information is being used, e.g. for operational purposes or strategic objectives. Moving from an arm's length relationship to a collaborative level is based, not only on which type of information being exchanged, but also on the impact of the means of communication. Three major types of supply chain relationships are commodity-based relationships, vendor type partnerships and strategic collaboration.

7. Discussion

The framework positions the three levels of e-business initiatives according to the degree of information integrated into the supply chain management process. This conceptual model of supply chain relationships is proposed not as a definite taxonomy of interdependence, but as a framework built around common obstacles that captures some of the transition difficulties from one level of interdependence to another, with investment in e-business technology. The framework suggests three possible alternatives for developing and maintaining supplier/buyer relationships in the context of integration of e-business into business processes, including (1) step by step integration, (2) quick integration and (3) reactive mode.

Step-by-Step Formulation. This strategy, path 1 in Figure 3, allows two trading partners to establish basic links for transmitting a number of document types such as, in most cases, product information and selection criteria. The

different types of communication technology applied here, include traditional telephone, fax and papers. Organizations may adopt a combination of e-business methods to lower their transaction costs at this stage and to search for potential suppliers and distributors. This type of relationship is specified by a low level of investment in both technology and commitment in information sharing.

The trading partners then gradually add more types of documents to their existing e-business systems, including order, financial reports, manufacturing schedules, and transportation movements. The adoption of EDI has brought suppliers and customers to a network of selected and well-defined members as in a club [9], in which they can benefit from sharing more structured information for those members. The extent of information sharing and the degree of collaboration depend to the level of trust placed on the trading partners [6].

Information systems such as EDI could be used as a key enabler for competitive advantage through cementing relationships with suppliers/distributors, enabling integration forwards or backwards in the industry. Long term commitment and contract are assumed at this stage due to the large amount of information exchange and investment in technology. Investment in e-business such as XML/EDI at this level could increase switching cost as well as increase the level of asset specificity and management cost.

As companies have their common networks and share information among members, they tend to move towards sharing common operational programs (efficiency and cost related) and strategic issues (risk and rewards). The information from orders and inventory should be connected with material and production plans, as well as invoice systems and accounting information. At this stage, companies exchange their technical data, and have joint product development and strategic planning. The use of advanced technology such as video conferencing and technical data transfer (CAD/CAM) has taken place to provide a more effective source of information management in supply chain. This type of relationship moves toward more collaborative environment with a high level of commitment and investment.

This step-by-step formulation path seems to be suitable for numerous companies especially when they have little or no e-business experience. Jun et al., [21] discussed an example, when a dominant firm in the buyer-supplier relationship decided to adopt EDI due to competitive pressure or perceived benefits of EDI, this approach can offer the firm sufficient time to adapt itself to this new information technology and to restructure its business practices and applications. This strategy may equally appeal to the less powerful company, which usually consists of a small business that is often pressured into adopting EDI by its large trading partner. Since many small businesses tend to have a low level of organizational readiness for EDI due to their lack of financial resources and technical knowledge [22], they prefer a low initial investment in the early stages of EDI implementation. Moreover, this strategy can also provide them with additional time to prepare for their new information technology and opportunities to understand the real benefits of EDI, thus enhancing their confidence and desire for continuing investment in upgrading their EDI systems.

When there is a balanced power relationship between two trading partners and they both have a high level of organizational readiness for EDI, the quick build-up strategy is likely to be the most viable choice.

Quick build up. This approach, path 2, attempts to construct in the first stage a complete and functioning e-business system that is fully integrated into existing internal computer applications, and which is able to electronically transmit a variety of business documents. Then the selected members of the supply chain networks, mainly the key suppliers/distributors, are encouraged to exchange high volume and diversity of business documents. Hence, the firm can achieve maximum potential benefits of the e-business system. Without the commitment of trading partners, the company may suffer from the high costs of maintaining technology. This relationship moves quickly from the arm's length relationship to the collaborative level, due to the heavy investment in e-business technology and the depth of information exchanged.

A dominant firm in the buyer-supplier relationship may choose this rapid integration strategy primarily due to competitive pressure or keen awareness of potential EDI benefits. However, the strategy requires a high level of organizational readiness for technology adoption, e.g., financial resources must be readily available for the expensive EDI installation and training costs. An example is of a large auto-manufacturer affording this type of relationship with a

high investment in an EDI system and moving quickly to collaborative relationships with their suppliers/distributors. In many cases, they force their suppliers to adopt the same or equivalent communication systems in order to support their relationships, as can be seen by the example of automotive manufacturers in the USA [23].

Adaptation. This approach, path 3, represents the evolutionary stages of e-business application by small companies that are coerced into adopting a complete e-business system by their larger trading partners. A small company is not likely to implement e-business systems such as EDI up to the point that it becomes absolutely necessary to meet the requirements of its trading partners. This is largely due to its limited financial resources. With the advent of internet-EDI, the financial barrier is reduced for small companies. In the second stage, the firm attempts to integrate e-business into its business process, such as accounting and production systems. The XML/EDI technology could lead to a dramatic change in the nature of information exchange and improve process integration [24]. This is in recognition of the fact that direct and indirect benefits of EDI arise largely through automation and standardization [25]. Jun et al [21] examined small firms and suggested that a small supplier may integrate the receipt of EDI orders into its order handling system and automatically send order acknowledgement to a buying company. Unfortunately, many small firms that have adopted this strategy to sustain the business relationship with the imposing trading partners fail to move to the second stage and continue to employ non-integrated, PC-based stand-alone EDI. They use EDI only as a substitute for traditional communication methods such as paper and fax, and fail to obtain the potential efficiency of EDI. Consequently, they tend to lose their initial enthusiasm for EDI and may develop negative attitudes toward the system.

In conclusion, the two dimensions of electronic business can be very useful to differentiate strategy to formulate and maintain supplier-buyer relationships. The proposed study aims to consider all aspects above and determine how companies align their business strategy with the dimensions of e-business systems in order to achieve "sustainable relationships" with their suppliers and distributors.

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