

# **Role of Information Technology in Establishing a Comprehensive Supply Chain Network**

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## **ABSTRACT**

*Innovations in information technology (IT) have affected all types of business transactions. In order to have an efficient physical supply chain, it is essential to establish equally efficient informational and financial supply chains. In this paper, we study the role of IT in establishing a comprehensive supply chain network.*

## **INTRODUCTION**

Organizations are forced to think in supply chain terms for producing and delivering goods due to economic and competitive pressures (Barry, 2003). Supply chain management is the planning, organizing, and controlling of the processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies. It is estimated that the amount of world trade of products done electronically will approach \$2 trillion by the middle of this decade [Cunningham et al, 1999]. A lion's share of that would be B2B e-commerce. E-commerce is generally understood to mean buying and selling of information, products, and services via computer networks [Kalakota and Whinston, 1996]. Examples of e-commerce include marketing applications such as electronic advertising, financial applications like electronic payment systems, and industrial applications such as product ordering and delivery of digitizable goods. One of the reasons for the failure of Electronic Data Interchange (EDI) services to fulfill its earlier promise is the absence of common standards for EDI [Leebaert, 1998]. The open infrastructure of the Internet which is the vehicle for e-commerce adds a new dimension to electronic transactions strengthening existing trading relationships as well as developing new commercial links. Manufacturing industry is affected by e-commerce in many important ways starting from raw material procurement to finished goods shipment. In this paper, we study the role of IT on comprehensive supply chain. This paper is organized as follows. First, we present some important implications of new innovation in IT on physical supply chain followed by the impact on informational supply chain. The concept of a comprehensive supply chain is discussed later. Concluding remarks form the last Section.

## **EDI, E-COMMERCE AND PHYSICAL SUPPLY CHAIN**

According to the European Model EDI agreement, Electronic Data Interchange is the electronic transfer, from computer to computer, of commercial and administrative data using an agreed standard to structure an EDI message (Kalakota and Whinston, 1996). Prior to EDI, business documents depended on conventional means such as USPS, UPS and FedEx. Computer communications have totally changed the speed with which documents can be exchanged.

Electronic commerce and EDI are not synonymous. E-Commerce includes EDI and much more. Interchange of information is vastly improved by using EDI techniques. Typically, there is no human involvement in the processing of information in EDI as the interface has software to software orientation. The data are structured in such a way as to be interpreted by software only. If a reply is involved, it is composed by a software to be interpreted by another software.

Before the introduction of e-commerce, in order to run an efficient physical supply chain, it was necessary to encounter excess working inventory and excess working capital to cope with the uncertainty of demand. The strategy consisted of having excess inventory, capacity and labor to compensate demand forecasting limitations, inefficient distribution and lack of supply chain visibility (Barry, 2003).

With the increased use of the Internet and the Extensible Markup Language, the degree of automation in supply chain transactions is bound to go up. To minimize disruptions during the change over to automation, it is necessary that companies must incorporate e-business concepts into their overall business strategies. During this transformation, we need to focus on a few critical factors that such as system-to-system integration, initial investment costs, supplier-buyer relationships, and changes to organizational culture due to automation of procurement processes.

## **B2B E-COMMERCE AND INFORMATIONAL SUPPLY CHAIN**

Let us consider the information flows that occur between a buyer and a seller. At the buyer's premises, a purchase request originates in the purchase department and is sent to the sales department of the seller. The sales department confirms the order as well as sends a message to the shipping department (if the item is in stock) or to the manufacturing department (if the item is to be scheduled for manufacture). When the item is ready for shipping, seller has to inform the transporter. Along with the physical delivery of the item, the seller sends an invoice to the buyer. Finally, the buyer sends payment.

For the above case information flow without EDI would mean paper documents transmitted among various departments in multiple organizations. There are several intermediate steps from purchase requisition at buyer's organization to shipping of the item at the seller's organization and finally the payment of invoice. This generates considerable amount of overhead in labor costs and time delays not to mention the greater likelihood of errors committed during the transaction. A similar scenario in an EDI environment would mean the automation of the following processes: transmission of purchase order, acknowledgement from the seller, booking confirmation from the transport company, seller's invoice, and buyer's payment.

The technological interface among the B2B e-commerce entities is currently being provided by the following three initiatives: universal description, discovery and integration (UDDI), e-business Extensible Markup Language (ebXML), and XML/edi (Bloomberg, 2001). UDDI is an XML-based registry service established by IBM, Ariba, and Microsoft. UDDI provides Green Pages where companies can specify their purchase order formats in addition to automated White Pages and Yellow Pages. United Nations has sponsored the ebXML initiative to create a single global marketplace. The objective is to create a framework where business and technology vendors can create consistent, robust, and interoperable e-business components. An attempt to

add the advantages of XML to legacy Electronic Data Interchange (EDI) systems has resulted in XML/edi. The incorporation of software agents to EDI is expected to resolve the ambiguities in the legacy EDI systems.

## **COMPREHENSIVE SUPPLY CHAIN NETWORK**

Lack of attention to financial supply chain will result in excess working capital. Typically, billion dollar enterprises today spend tens of millions of dollars annually for unnecessary working capital and inefficient processing functions because they lack visibility into the financial supply chain, especially receivables (Barry, 2003).

The implications of cost management from a total supply chain perspective are being considered increasingly by managers. Today, organizations are expanding the scope of cost-reduction initiatives to include both upstream (supplier) and downstream (customer) members of their supply chains (Handfield and Nichols, 2002). According to Barry (2003), by optimizing the financial supply chain, supply managers and their enterprises can reduce their working capital needs by as much as 20-25 percent, using better invoicing control and cash-flow management.

The other advantages envisaged are lower financing rates on required working capital, gain early warning into problems with any document in a commercial transaction that will likely cause invoice payments to be delayed 30-45 days past the due date, and then take corrective action to reconcile exceptions, and realize their prior investments in automating financial systems. Similar to innovations in manufacturing technology resulting in reduction of excess inventory as a hedge against uncertain demand, financial supply chain management will remove the need to compensate for uncertain receivables with excess working capital.

Enterprise Resource Planning (ERP) systems make it easier to realize the goal of comprehensive supply chain networks. ERP replaces the old standalone computer systems in finance, HR, manufacturing and the warehouse, and replaces them with a single unified software program divided into software modules that roughly approximate the old standalone systems. Finance, manufacturing and the warehouse all still get their own software, except now the software is linked together so that someone in finance can look into the warehouse software to see if an order has been shipped. Most vendors' ERP software is flexible enough that you can install some modules without buying the whole package. Many companies, for example, will just install an ERP finance or HR module and leave the rest of the functions for another day.

## **CONCLUSION**

Jim Shepherd of AMR Research states the following in a recent report: “The notion that a company can transform itself into an e-business by simply using a piece of software and adding it to its existing infrastructure is wrong and dangerous” [Neef, 2001]. In order to fully realize the positive impact of IT, it is necessary to integrate physical, informational and financial supply chains. In this paper, we study the need for such an integrated approach and means to achieve such a goal.

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