

# An Analysis on the Implementation of Electronic Supply Chain in International Trade

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**Abstract.** The advancement of information technology has allowed firms that participate in supply chain management to share information across organizational boundaries. An innovative transaction process which is electronically supported may lead to efficiency gaining and cost reducing, at the same time it enhances the operational effectiveness. The implementation of electronic supply chain in international trade improves coordination between buyers and sellers and increases transaction efficiency by raising the operational effectiveness. The paper gives us a rough introduction of electronic supply chain. Then it shows us the process of international trade in which an effective electronic supply chain is implemented. Finally, a case study about Dell is brought out to show how to implement E-supply chain in international trade.

## 1 Introduction

Fewer than 10 years ago, the purchase of a product, using some modes of transport to reach the shopping destinations, selecting the product physically, and then paying for the purchase. Today, many consumers, be they at home, at work, or at some other locations, can go online 24 hours a day, seven days a week, and select and purchase a great assortment of products over the Internet while doing their “shopping”. Indeed, it is now possible, in many instances, to buy books, videos, and CDs online as well as to order food from a supermarket or a restaurant in an electronic manner, and have the items delivered afterwards to the desired destinations.

Information technology (IT) allows a greater amount of data to be distributed with increased accuracy and frequency along the supply chains, and for their activities to be synchronized. As a result, the firms in supply chain are able to efficiently coordinate their business decisions and activities and become integrated (Frohlich, 2002[1]; Sahin&Robinson, 2003[2]). A tightly integrated supply chain leads to superior performance and improved competitiveness for each firm in the supply chain (Frohlich, 2002[1]), and many innovative firms have adopted SCM and its integrating mechanisms as a top strategic priority.

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In supply chain management, much of the past debate had centered on the ability of the supply chain to be either “lean” (Womack&Jones, 1996[3]) or “agile” (Goldmanetal, 1995[4]). Lean supply chains on the one hand focus on doing “more with less” by reducing waste through inventory reduction, lean manufacturing, and a just-in-time approach. A lean approach is said to be suitable for markets characterized by predictable demand, high volume and low requirements for product variety. Agile supply chains, on the other hand, are designed for flexibility, emphasizing the supply chain’s ability to respond rapidly to changes in demand, both in terms of volume and variety. The market conditions in which companies with agile supply chains find themselves are characterized by volatile demand and high requirements for variety (Christopher, 2000[5]).

Some supply chain scholars also have championed various complementary perspectives in order to resolve problems in collaboration and information sharing, including optimization-, simulation-, and multi-agent-based. Prior research focused primarily on optimization-based techniques and mathematical modeling of operational aspects of information sharing (Maturana&Norrie, 1997[6]). Management Science/Operations Research (MS/OR) researchers have used this approach extensively to identify optimal solutions for given situations subject to specific assumptions. This approach is strong in addressing focused sets of problems, such as inventory management, logistics optimization, and production scheduling. Simulation-based approaches allow dynamic modeling of behaviors of supply chain firms with varying degrees of constraints and policies, dealing with diverse contingencies caused by supply and demand uncertain ties. However, they can not generate the design itself, and can only run models with pre-specified parameters and conditions (Harrison, 2001[7]).

The advent of electronic commerce is enabling the world to move closer to the realization of a single, borderless market and is driving the increasing globalization of not only businesses but also supply chains. Indeed, the importance of global issues in supply chain management has been emphasized in several papers (cf. Kogut and Kulatilaka, 1994; Cohen and Mallik, 1997; Nagurney et al., 2003[8]). Recently, Dramatic advances in IT have enabled supply chains to integrate various functions into their total processes within e-business settings (Cagliano, Caniato, &Spina, 2003[9]; Vakharia, 2002[10]). The scholars are paying more attention on supply chain in the setting of electronic commerce, because electronic supply chain is becoming more important. The implementation of electronic supply chain can reduce cost greatly especially in international trade. Now the little research on electronic supply trade is mainly theoretical, and there is little research on the practical area. This paper will present the implementation of electronic supply chain in international trade.

The paper’s organization is as follows: Section 2 gives us a definition of electronic supply chain and discusses the electronic global market. Section 3 briefly outlines an electronic trading framework, in which electronic supply chain is implemented. Section 4 focuses on the case study about Dell and compares its electronic supply chain with its traditional supply chain. Section 5 will do a summary about the article and give some advice on the research of electronic supply chain.

## 2 Electronic Supply Chain and a Global Electronic Market

The advancement of information technology has allowed firms that participate in supply chain management to share information across organizational boundaries, bringing about substantial performance increases. For example, the collection of sales information at the point-of-sale and the sharing of that information via an electronic data interchange have lowered costs in the ordering processes.

### 2.1 The Growing Importance of Electronic Supply Chain

Firms today increasingly consider supply chain management (SCM) to be a major vehicle to gain a competitive advantage in turbulent markets. While firms have traditionally acted as sole economic entities in the market, they have begun to form strategic alliances with other firms, integrating their business processes, and consolidating their resources. According to the Global Supply Chain Forum, SCM is defined as:

“The integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.”(Lambert & Cooper, 2000)

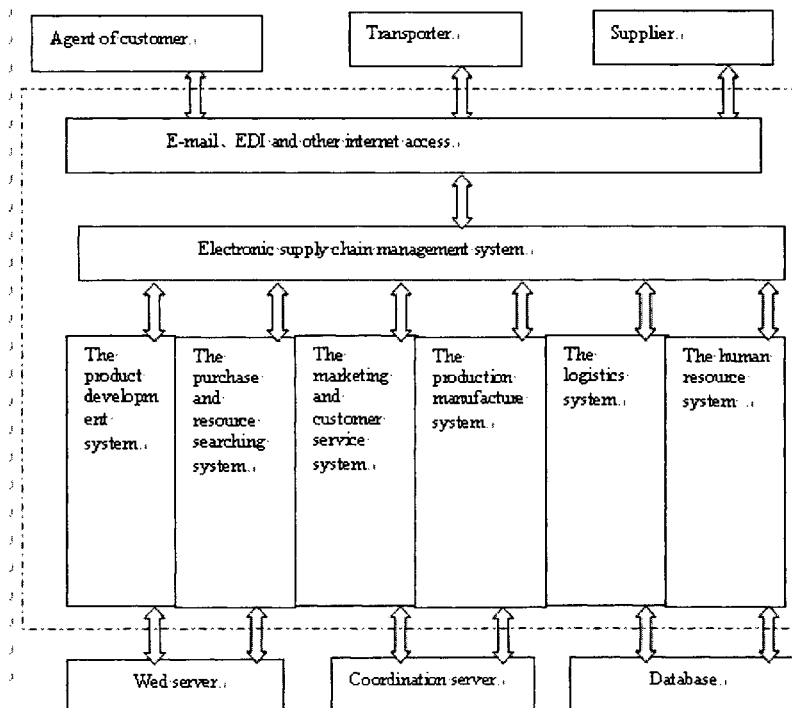


Figure. 1. The frame of electronic supply chain management: from Guan Shurong [11]

Electronic Supply Chain (ESC) is a functional network chain structure pattern consisting of the suppliers, manufactures, and distributors, which integrates the key business processes from raw materials purchase, middle products and final products manufacturing to the ender users' consuming through controlling the information flow, the physical flow and the fund flow. It is an organizational connection network which provides the end users with the products and services.

ESC is mainly realized through conforming electronic commerce and supply chain. The conformity angle contains the entire organization flow, such as product development design, purchase and resources search, marketing and the customer service, the production manufacture and the daily arrangement, the logistics supply, the manpower resources and so on.

Through the clarifying states of the related content about electronic supply chain management, this article gives us the brief framework of the electronic supply chain management system, as it is shown in figure 1. From the figure we can see that the agent customer, the transporter and the supplier can exchange their information through E-mail, EDI and other international access without visiting the partners physically. Electronic supply chain management system concludes the subsystems of the product development, the purchase and resource searching, the marketing and customer service, the production manufacture, the logistics and the human resource. This is the company's intranet. The enterprise can coordinate his interior processes through the system, and the subsystems are managed by different departments, they also can connect with each other through the web servers, coordination servers and database. Using the electronic supply chain system, the departments also can know the information about the products' production, marketing and inventory without face to face talking. It can improve the efficiency of the company. In a word, the implementation of electronic supply chain system is helpful to coordinate the purchases between the enterprises and the suppliers, the material managers and the transport companies, the sales organization and its wholesalers, as well as company's daily activities and customer services.

## **2.2 A Global Electronic Market**

SCM has gained importance in the marketing field as being one of the main marketing processes that has a positive influence on shareholder value. And lately, International marketing place have gained importance for electronic supply chain management. For example, Wildemann et al. presented some application examples for international marketing place within electronic supply chains, such as using e-auctions, online-brokers, e-catalogues, or e-freight stock exchanges for e-procurement, e-logistics, and customer relationship management. Lancioni et al. have argued that companies do not use the Internet much for supply chain issues.

## A B2B eMarketplace - Supply Chain

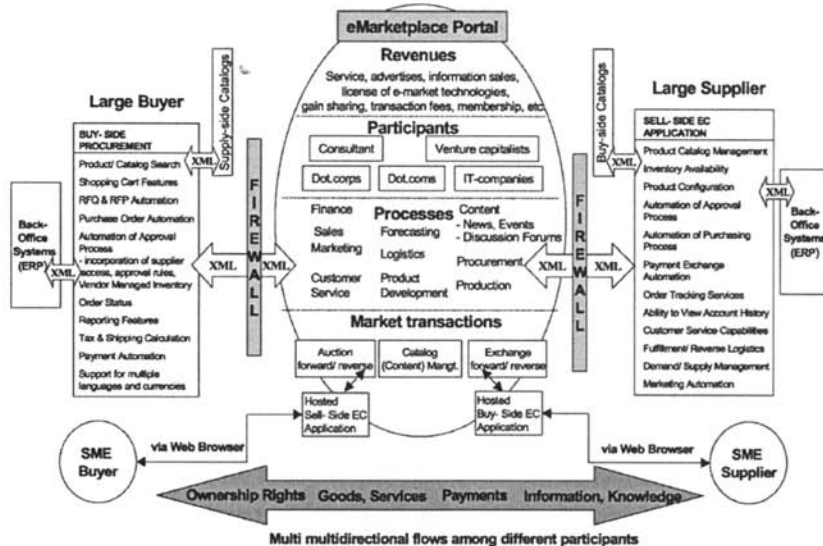


Figure. 2. Electronic marketplace supply chain: from the view of Grieger [12]

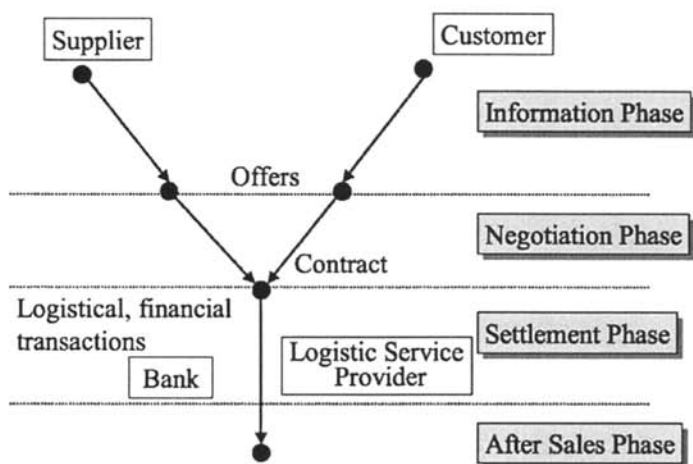
Fig.2 gives us a detailed supply chain in electronic market place. We could see that in international trade process the major buyers and the major suppliers can contact with each other and do most of their businesses through the internet. For the major buyers, they can carry on this procurement such as a product search, shopping cart feature, purchase order automation, automation of approval process and so on. For the major suppliers, they also can finish these applications, such as product catalog management, inventory availability, product configuration, automation of purchasing process, order trading service and so on. For the small-medium enterprises, they also can do market transactions through the web browser. It can reduce the trading cost largely.

### 3 The Implementation of E-supply Chain in International Trade

Supply chain scholars have championed various complementary perspectives in order to resolve problems in collaboration and information sharing. (Maturana & Norrie, 1997). Lancioni et al. surveyed 1000 US firms that were members of the Council of Logistics Management regarding their application of Internet technologies within their supply chains. They found that Internet adoption had increased from 1999 to 2001, moving away from indiscriminate use of Internet-related processes towards more focused, strategic applications and the development of precise and measurable goals. Their study, "Strategic Internet Trends in Supply Chain Management", shows that beyond cost reductions, the use of electronic supply chain increases productivity and profits for participating firms. The Internet

allows firms to customize service solutions for their customers, which enhances the overall value and competitive position throughout the supply chain network.

The international trade process includes looking for the trade partners, purchases, goods transportation and track, payments and post-sale services. We will explain how electronic supply chain is implemented in international trade process, as follows.



**Figure. 3.** Phases of market transactions: comparison of Schmidan Lindemann [13] and Scharl [14].

### 3.1 Looking For the Trade Partners

Looking for the trade partners is the first step for developing international trade. In the traditional way, the buyers or the sellers have to pay the extremely high price, for seeking the appropriate trade partners. But looking for the trade partners using the electronic commerce may save much manpower and many physical resources, without limitation of time and location. On one hand, the enterprises can provide supply and demand information about the related products and the services to the potential customers in the world by establishing their own websites or drawing support from the related electronic commerce platform of international trade, attracting correlated customers to do business with each other. On the other hand, the enterprises may search for all kinds of economy and trade information on the internet, seeking the ideal trade partners. With the development of electronic commerce, the role of "the Guangzhou trade fair" was weakened in some content. The domestic importers and exporters may find the overseas trade partners without going abroad.

The overseas customer may also easily find the most ideal Chinese Import and export Enterprises.

### **3.2 Electronic Purchases**

The electronic purchase is trying to realize the enterprises' electronic purchase of the products, the raw materials, the unproductive products and the services by the purchase process on the internet. It may simplify the distribution, reduce the cost and improve the efficiency. A completely developed electronic purchase system should be able to automate the purchase process. Present electronic purchase software may be divided into 3 categories. The first one is buyer desktop purchase system. It may help the enterprise staffs to carry on the purchase through the table computer. The second is buyer central purchase management. It helps manager and the buyer to manage the purchase process, analyze transaction information and manage the suppliers. The third is sellers' application software. It helps the manufacturers and distributors to sell products through the network. It usually includes the electronic catalogue, the electronic transaction order and so on.

### **3.3 Electronic Transportation and Track**

Generally the electronic transportation and the track establish the intranet of foreign trade transportation through the ports. Electronic data interchange (EDI) is being used in booking shipping space, handling containers and ships, tracking the cargos, transmitting documents, finance and settlement. With the application of merchandise tracking system on internet, the customers and their trade partners can directly get inquire about the information of the cargo's conditions, get the transportation and commercial partners' information which reduces the time of cargo stock and the time of the cargo customs clearance, and speeds up the trade distribution. The electronic management of foreign economy and trade transportation widens the electronic commerce by the operation process of trade chain. United Package Service Company (UPS) is a typical case, which carries out "The entire process supervision". Namely, it is using the company's automotive packages tracking system to monitor the packages during the entire delivering process.

### **3.4 On-line Payments**

On-line payments in the international trade is extremely convenient for the intangible products, such as software, music, film and consult services, which can be directly transmitted on internet. It may save many personnel's expenses. At present, there is not any domestic enterprise that can completely realize the on-line payment in international trade, which needs to overcome the technical and security problems. The on-line payment requests electronic finance. The E-bank will be established ultimately. So the domestic and foreign banks are adjusting their own strategies to meet the increasingly high requests of a bank in the electronic international trade. Now there are banks which developed totally depending on the development of

intranet. With the increasing development of network security technologies, the on-line payment' superiority will be displayed more obviously in the international trade.

### **3.5 Electronic Post-sale Services**

The electronic post-sale services mean that Internet is used in the post-sale service to collect the information of the customers and the products and store them into the database. Putting the information about the product literatures, technology reports and ordering on the internet not only makes the post-sale service personnel save time to deal with more complex matters and manage the customer relationship, but also provides the new business increase for the enterprise and promotes customers' satisfaction and loyalty.

### **3.6 Transactions Management Network**

The activities of international trade involve many government departments as well as the finance, the insurance, the transportation and other service sectors. The management of international trade transactions includes the related market laws and regulations, the taxation collection, the declaration and the transaction dispute arbitration. In the traditional operation process, the enterprises must alone deal with each related department which surely spends massive manpower, the physical resources, and takes the massive time. Electronic business makes the international trade transactions achieve network management paperless. The engaged enterprises can directly handle with the banks, the insurance companies, the taxation departments and the transportation companies to manage the related electronic bills and the electronic documents through internet, which has greatly saved the time and the expense in transaction process.

## **4 A Case Study: Dell Corporation's Electronic Marketing**

This section highlights a short case study about Dell Corporation that describes implementation of electronic supply chain in international trade.

An important success for Dell Corporation is that Dell successfully applies the internet to the company management. The following is the organization network which starts from the suppliers to Dell Corporation, then arrives the customer. That's Dell's supply chain which is established based on the network and the modern technology.

From the following chart, we can see that, compared with the traditional supply chain, there are main two differences: (1) There is no wholesalers and retailers in the supply chain established by Dell. Dell Corporation as the manufacture sells its products to the customers directly. Dell's proud of its selling philosophy----directly selling the computers to the users, removing the retailers' profits and saving the money for the consumers. (2) There is a new distribution level: "the agent server".



They neither provide the products to the customers; nor purchase the products from Dell Corporation. They only provide the services and the supports to the customers. This is the inevitable result of Dell Corporation "outside contracting approach". It enables Dell to provide the high quality post-sale services to customers; at the same time it also enables Dell to avoid facing the problem of "the excessively huge organizational structure".

By this way, the components suppliers, Dell Corporation and the agent servers constituted a "virtual" enterprise. They improve their coordination and achieve the optimized resources disposition through electronic data exchange. Simultaneously, they also reduce the costs; provide the high quality products and the services for the customers. Dell Corporation succeeds in realizing "Virtual integration" between the suppliers and the customers, and forming an effective supply chain.

At present Dell's approximately one third technical support works and over 70% order inquiries are carried out on internet. Website "www.dell.com" accepts about 40,000 emails each month. About 90,000 files are downloaded by users each week and global order inquiries are approximately 100,000 pieces. Over 40,000 enterprises, government departments and the organizational customers have adopted the DELL special user services in the world, dealing with all the businesses with the Dell on line. Because of the cost reduction and the improvement of the productivity, they may save expenditures as high as several million US dollars every year.

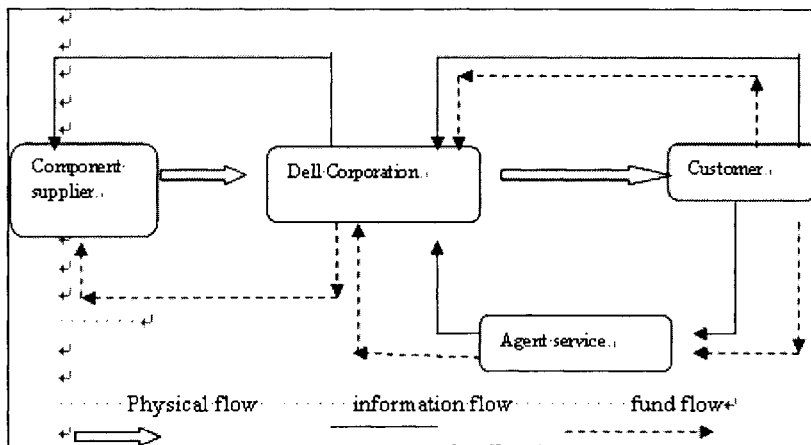


Figure.4. The electronic supply chain of Dell: from Liu Hongqiang [15]

## 5 Conclusions

This paper has introduced the definition of supply chain and induced the essence of electronic supply chain. ESC is an organization network, which integrates the key business processes. It provides the mutual connection in the activities and processes of providing the products and services to the end users. Then, the paper gives us the

implementation of ESC in international trade. The international trade process includes looking for the trade partners, purchases, goods transportation and track, payments and post-sale services. The paper gives a detailed implementation of ESC, such as the electronic purchase, on-line payment and so on. Finally, there is a case studying about Dell. Dell is a successful example. It uses the electronic supply chain to sale his products to the world, propagandizing products and receiving the orders on-line. After a detailed analysis of Dell's electronic supply chain, we could get the results that the implement of ESC in Dell Corporation have improved the efficacy and improve its performance greatly.

Transaction processes in international trade are complex and, as a consequence, often inefficient. From the analysis of ESC we can know that the application of ESC in international trade leads the international trade become paperless and electronic. The suppliers and the buyers can both realize automation, which is a great advantage in trade. In today's global markets, having an effective ESC can be a source of superior advantage. It can save a lot of time and money for the traders.

This paper presents the implementation of ESC in international trade from the practical perspective. The benefits brought by ESC are visible. But the building of the electronic supply chain system needs information technology and money costs. Maybe it cannot be taken by the small and medium enterprises. So it's better to do some survey about the small and medium enterprises, and the benefits from the implementation of ESC in international trade still need the support of theoretical research.

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