

The Compounded Role of E-Commerce in Achieving Supply Chain Excellence in Manufacturing Perspective

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ABSTRACT

Firms are moving from network based supply chain to e-commerce based supply chain .It's a process where the firms will integrate and coordinate suppliers, manufacturers, logistic channels and customers using internet platform. USA National Research Council Committee on Supply Chain Integration has defined the integrated process (e-commerce and supply chain) as an association of customers ,suppliers and manufacturer who, using defined management processes ,work together to optimize their collective performance in the creation, distribution ,and support of an end product over the full product life cycle. In today's business environment, most OEM manufacturers no longer compete only as autonomous corporations. They actually compete in terms of integrated supply chains. This had forced the players in the market to always keep improving their supply chain. Due to this, firms are looking at e-commerce based supply chain as a solution . For the purpose of this paper we had discussions with a supply chain manager of an multinational electronic company. From the discussion we manage to capture the picture, how the e-commerce based supply chain processes actually work. In this article we had listed the processes involve within the entity that exist in the e-commerce based supply chain [ATM, Logistics, Supplier, Distributor and Customer].We had also highlighted the benefits gain by the e-commerce based supply chain players especially by the manufacturer(ATM).

Keywords: e-commerce, assembly test manufacturing; supply chain management

1.0 INTRODUCTION

In 1994, e-commerce as we now know did not exist. Ten years later, in 2003 around 75 million American consumers are expected to spend about \$95-\$100 billion on e-commerce business and it is estimated to grow to \$217 billion by 2007, according to a recent Forrester research report (Johnson et al, 2002) The e-commerce development had a great impact on all aspects of business, including customer acquisition, marketing, human resource management, finance and operations. Supply Chain Management that has played an important role in the traditional businesses is likely to be crucial in the digital economy as well (Geoffrion and Krishnan, 2001).Keenan and Ante (2002) note that during the next five years, collaboration by the supply chain using e-commerce platform can potentially save \$223 billion. Knowing the advantage, players in industry had started moving towards integrated e-commerce based supply chain. The large potential impact of the e-commerce on supply chain management makes the study on how

the integrated e-commerce based supply chain processes actually work and the benefits gains by the SCM partners is timely and important. Supply chain is a vast topics. We first provide a clear definition of this topics

Definition of Supply Chain Management

Various definitions of a supply chain have been offered in the past several years as the concept has gained popularity. The definition has become broader but the basic element in the concept still retain. The Supply Chain Council (1997) describes the supply chain as the processes from the initial raw materials to the ultimate consumption of the finished product linking across suppliers-user companies. Supply Chain Management (SCM) defined as the functions within and outside a company that enables the value chain to make products and provide services to the customer (Cox et al, 1995). Recently, the globalisation of manufacturing has forced the research on manufacturing and logistics to not only consider material flows in the traditional value chain, but rather in a network of facilities (Thiru and Veera, 2004).

The new millennium, has brought forth new development in technology and organizational structures. E-commerce, and in particular, the internet, play a key role in furthering the goals of supply chain integration. This development had created new definition for the supply chain world. Supply Chain Management (SCM) defined as an organization that linked within and between trading partners by the internet and /or EDI to buy, sell, move products/services and cash flow (Williams et al, 2001) Monezka and Handfield (1998) defined SCM as "an organizational concepts whose primary objective is to integrate and manage the sourcing, flow and control of materials using information technology tools". Kim and Lm (2002) had defined supply chain as a process to integrate and coordinate suppliers, manufacturers, logistic channels, and customers using information technology. And it will be the definition used throughout this paper. The integrated e-commerce based supply chain specifically refers to "the planning and execution of the front-end and back-end operations in a supply chain using the internet. (Lee and Whang, 2001)

2.0 E-COMMERCE BASED SUPPLY CHAIN PROCESS

This paper will be focusing on the Assembly Test Manufacturing (ATM) industry and not on Original Equipment Manufacturing (OEM). OEM is the manufacturer who manufactures finished products like Dell and Compaq HP for personal computers and laptops. Whereas Assembly Test Manufacturing (ATM) is the manufacturer who manufactures part and components for OEM like Intel and AMD for microprocessors. We will be only looking at integrated e-commerce based supply chain process aspect and how it actually works in Assembly Test Manufacturing industry (see Figure 1).

Order Processing

Generally in any e-commerce based business, the driving force will be more toward the customer side or in business jargon in is known as "Pull Factor" (Lawrence et al, 2003). In relation to this concept, the supply chain management which incorporates e-commerce will definitely be influenced by the above mentioned pull factor. "Demand Management System" had been used as a tool to reflect the trigger by the Pull Factor in the integrated e-commerce based supply chain, where the demand for product by the customer and various SCM stake holders will be channeled through this system. While all the supply chain partners were would be integrating internal operation through standard Enterprise Resource Planning (ERP) software packages ,the Demand Management System had been used in the area of external connectivity .(S.Pant et al., 2003).

Initially the customer order preference will be set through the order system in the Demand Management System. The system will accept the order requirement and decision will be made whether the product is available or not available. It's a critical task for the system because it had to handle the customer queries and order on the real time basis.

- **If the product is available.**

Under this circumstances the system will provide the prospect customers the availability of the promise (ATP) tag after finding out whether the Assembly Test Manufacturing (ATP) is capable of supplying the product in the quantity demanded and meet the delivery and other related requirements of the customer(see Figure 1). The system will also take in consideration of the delivery time required by logistics In the manufacturing environment this known as Customer Goods Issue Date (CGID). Under the world class manufacturing concept which gives the importance to the customer satisfaction and providing timely goods delivery, the Customer Dock Date (CDD) is used to replace CGID.. This is because the CDD gives accurate information on when the

customer will receive the ordered goods but the CGID will only provide the date of which the manufactured goods is shipped out of the manufacturers premises or warehouse. This information of CDD can only be obtained through integrated e-commerce based supply chain platform which intelligently integrates the whole supply chain partners or stake holders.

- **If the product is not available**

When the ordered product is not available in the present stock, there is a need for the Assembly Test Manufacturing (ATM) to either manufacture the product or to outsource the making. If the product is decided to be manufactured then the bill of material (BOM) data will be generated using the Assembly Test Manufacturing internal system.The data will be channeled to all the predetermined suppliers through the Demand Management System. Based on the feedback given by the suppliers and other partners of the SCM system with the assistance of the e-commerce integrated supply chain system the CDD will be determined and informed to all the supply chain partners including customers.

Order Production

Like any other manufacturing processes the Assembly Test Manufacturing is still fostering the basic manufacturing process step such as

- Fabrication
- Sort
- Assembly
- Test

As such there are 3 types of manufacturing practices by the ATM which are

- Make-To-Order (MTO) - the product will be readily manufactured and stocked while waiting for order to generate. In this case the ATM will bare the inventory holding cost such as warehousing and material handling.
- Assembly-To-Order (ATO) - the product will be manufactured and assembled but no testing done on the product. The test (functional and structural) for the product will not be done until an order is confirmed. In this case, the ATM will avoid the SFGI(Semi finish goods)holding cost.
- Fuse-To-Order (FTO) - the product will only under go the fabrication stage and sorting but will not be assembled and tested until order is confirmed. Therefore the ATM which practices this type of order manufacturing could eventually be very cost effective in their manufacturing. The introduction of integrated e-commerce based supply chain had opened the door for the ATM to implement the FTO manufacturing practices

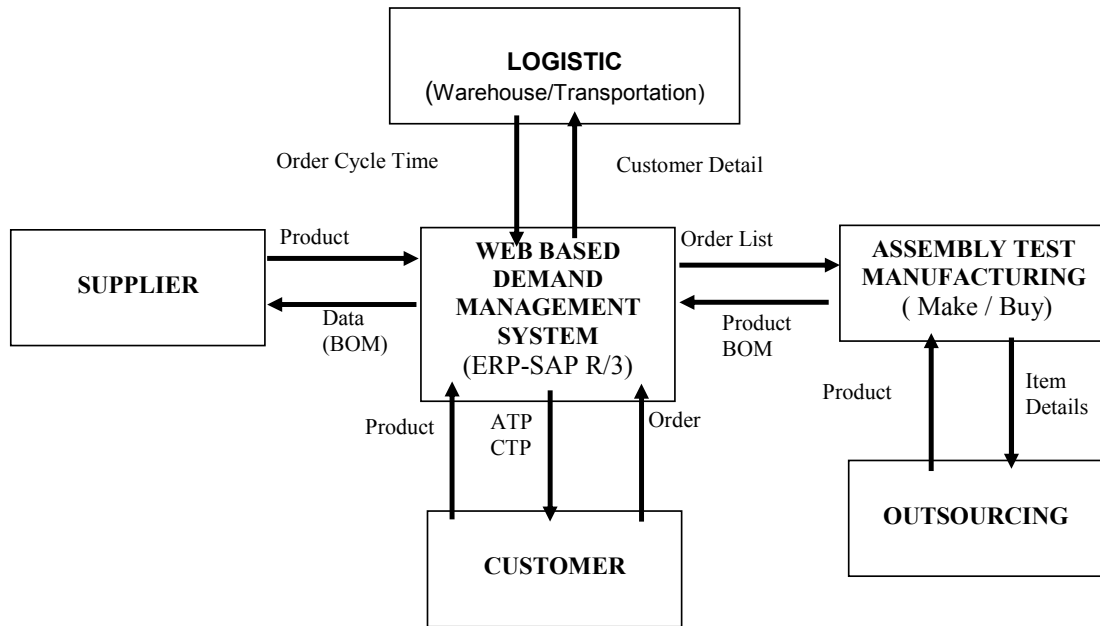


Figure 1: Integrated E – Commerce Based Supply Chain Process

3.0 BENEFIT OF INTEGRATED E-COMMERCE BASED SUPPLY CHAIN

Supply Chain Simplification

Many manufacturing firms have spent the past two decades reducing the size of their supply chains and working more closely with a smaller group of “strategic” supplier firms to reduce both product costs and administrative costs, while improving quality of the chain. Manufacturing firms manage to achieve this dream with the help of integrated e-commerce based supply. For example, the Lighting Division of GE realized a 20 per cent reduction in material acquisition costs by using the integrated e-commerce based supply chain to reach a group of “strategic” qualified vendors that previously considered, including some that offered comparable products at lower prices (Cross, 2000) Japanese automobile industry, for instance has systematically reduced the number of it’s suppliers by over 50 per cent. Instead of open bidding for orders, large manufacturing have chosen to work with their strategic partner supply firms under long term contracts that guarantee the supplier business, but also establish quality and cost. These strategic partnership program had open the room for just-in-time production models, and often involved joint product development and design, integration of computer systems and tight coupling of

the production process of two or more companies (Laudon and Traver, 2003).

Value Networks

A value network is a business design that uses integrated e-commerce based supply chain concepts to achieve both superior customer satisfaction and profitability. It is a fast, flexible system that aligned with and driven by new customer choice mechanisms. An example is depicted in figure 2, which shows that in some cases the firms suppliers partners may interface directly with each others, or even deliver their product or services directly to their customers. Cisco is an interesting example of integrated e-commerce based supply chain that had created a highly efficient value networks. About 80 per cent of Cisco’s product value is created by supplies and about 60 per cent of all units are shipped directly by Cisco’s suppliers to its customers (Lee and Whang, 2001). Successful execution of this business design is based on the integrated e-commerce based supply chain technology and highly disciplined business processes, applied across the supply chain networks. Using this system, Cisco reduces cycle times for order to delivery from 6 to 10 weeks down to 1 to 2 weeks. Cisco had also managed to lower their inventory holding, achieve faster and more accurate order fulfillment, and reduce costs.

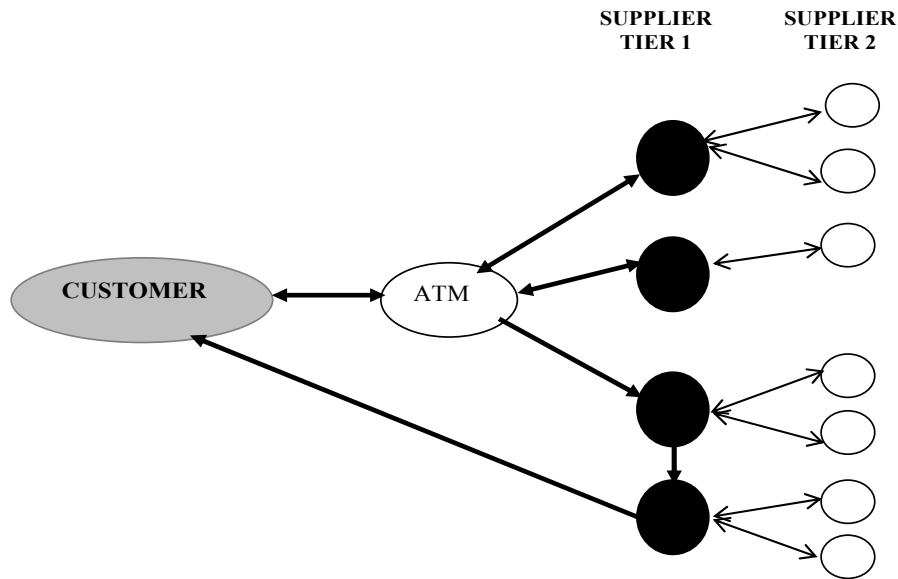


Figure 2: Value Networks

Information Sharing and Visibility

Information sharing and visibility is the foundation of integrated in e-commerce based supply chain .For the players across the supply chain to coordinate their product, financial and information floes, they must have access to accurate and timely information reflecting the status of their supply chain. (Lee and Whang, 2001) .The current trend in the integrated e-commerce based supply chain industry is to try to leverage the benefits obtained through information sharing (also called visibility) across the supply chain to improve operational performance, customer service, and solution development by reducing the “bullwhip effect”(Swamnathan and Tayur, 2003).At the early stage of supply chain development information movement have been very silo based, and not a lot of real collaboration was going on. The problem was that the interaction between the individual players in the supply chain was primarily human-to-human .The speed with which information traveled limited the unity of that information and cause the problem of demand information distortion and in the supply chain it’s known as “bullwhip effect”. When the information move from one level to another in a supply chain the distortions are amplified, and it’s consider to be one of the biggest causes of inefficiencies in a supply chain. With the implementation of integrated e-commerce based supply chain which had contributed to real time information sharing, it had uncounted the bullwhip effect in the supply chain. It is highlighted that one of the reason for Dell’s success is the ability to transmit timely and accurate information to its suppliers (Swaminathen and Tayur, 2003).

Customization and Personalization

Personalization is the ability to treat people based on their personal qualities and prior history with the supplier. Customization is known as the ability to change the product to better fit the needs of the customer (Laudon and Traver, 2003). These two key

elements had made the integrated e-commerce based supply chain more powerful than the traditional supply chain. Traditional supply chain inventory management models assume that inventory is stocked and demand is satisfied based on availability (called make-to-stock system).With the development of integrated e-commerce based of supply chain, firms had moved to build-to-order environment or have adopted customization and approach.(Swaminathan and Tayur, 2003).Customization and personalization ability had opened the room for the OEM to serve their customer better and gain their loyalty support. For example, Nike has been offering lets customized sneakers through its Nike iD program on it’s integrated e-commerce based supply chain site. Consumers can choose the type of shoe, colors, material and even a logo of up to eight characters. Nike transmits the order via computers to specially equipped plants in China and Korea. The product will be delivered to customer within three weeks(Laudon and Traver, 2003). This ability had made Nike to gain their customers’ confidence and loyalty.

4.0 CONCLUSION

E-commerce has been a powerful and compelling enabler of supply chain integration in any industry today. Companies that adopt the integrated e-commerce based supply chain tools, will find the ultimate benefit of participating in term of competitive advantages over their competitors that do not participate. In this case, integrated e-commerce based supply chain does become the end game.(Thomos and Westbrook,2002).Despite the great benefits gain by the supply chain players, growth of the integrated e-commerce based supply chain is slow. Reasons for the slow growth include the following:

- internal challenges-organization invariability require considerable resources to implement

highly integrated e-commerce based supply chain system. Most of the software packages for creating this supply chain system are quite expensive and required several powerful computers, database systems, and local and wide-area communication links, which also required large amount of investment (Wager,2001).Therefore, before a firm creates an integrated e-commerce based supply chain system, its senior managers have to carefully assess if they have the necessary commitment, time, and ability to manage a major change effort in the firm

- external challenges-Challenges related to bringing supply chain partners on board and making them a part of the extended enterprise system are as important as the challenge firms faced internally. One of main challenging area is to build the mutual trust among the business partners(Munson et all, 1999)
- Lack of guidelines for creating alliances with supply chain partners and failure to develop measures for monitoring alliances..
- Inability to broaden the supply chain vision beyond procurement or product distribution to encompass large business process.
- Lack of integrated information system and electronic commerce linking firms.
- We hope in the next few years, we will see an explosion of highly integrated e-commerce based supply chain as visionary companies develop new paradigms of e-commerce supply chain business for the future.

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