

# Integration of Supply Chain Management with Internet and Enterprise Resource Planning (ERP) Systems: Case Study

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## Abstract

**Purpose** - The purpose of this study is to examine the affects of the integration of technology with supply chain management.

**Design/methodology/approach** - Using case study methodology, this paper outlines the case of Dell Computer. The use of case study methodology permits a detailed and in-depth examination that is not possible in a wide cross sectional study.

**Findings** - From the findings, it is recognized that there are tremendous benefits which can be derived by implementing technology in industries supply chain (SC). Existing literature also suggest that the benefits of SCM are most evident in information management after the integration of Internet or Enterprise Resource Planning (ERP) systems.

**Research limitations/implications** - We recognize the limitations of our research which follows the limitations of the case study methodology. Because the case study research focuses on a few individual firms, we do not have the benefits of making generalizations across a wide cross sectional sample. Future research may be directed by extending this work by examining more case studies or including other factors that helps in enhancing supply chain quality.

**Originality/value** - This research demonstrates the affects and benefits of the integration of Internet and ERP with supply chain management. This research also provides a number of future research possibilities.

**Keywords:** Enterprise Resource Planning (ERP), Internet, Supply Chain Management (SCM), Technology

**Paper type:** Case Study

## Introduction

With today's emphasize on cutting costs, reduced inventories, streamlining expenses, lowering operating cost and gaining strategic advantages many companies are looking to develop their bottom lines with more effective and successful supply chains. In order to achieve these goals, supply chain competency must be placed at the heart of a company's business model. Firms realize that the competition is driven by customer demand. Effective supply chain management can offer customers high quality products and services with low prices (David et al, 2004). Unfortunately, many people related with different organizations don't have a clear understanding of what a supply chain is or how it fits into the company's overall strategy. The term supply chain management (SCM), from its basis was an effort to improve the logistics and material managements. It was developed to classify the connection between the organization, it supplier and the customers. First it was just considered as a link between the organizations and the suppliers but now it is considered as an important part of value creation.

The supply chain is now seen as being an important part of the value creation process. Customers not only want the right product, they want it “when they want it”. Supply chain management recognises this and focuses effort on achieving tight integration between the various links of the chain. These include procurement, operations and logistics from the identification and selection of appropriate materials and components right through to delivery to the end customer and the realisation of customer satisfaction.

Supply chain managers attempt to increase quality, reduce costs and increase profits by addressing the performance of supplier relations, supplier selection, purchasing negotiations, operations, transportation, inventory and warehousing.

Put simply, customers want and increasingly expect:

- Shorter lead times
- Flexibility, configurability, customisation; and
- Things to work “out-of-the-box”.

At the same time, suppliers want:

- Less inventory; and
- Less risk/greater reliability (less damage, fewer returns) (Dawson, 2002).

The power of SCM is well exemplified by Dell Computers. Started in 1984 in Austin, Dell Computers was ranked the No.1 PC maker in the US market in 1999 (Shah, 2001). Dell’s direct-sales model is well known to the business community. Dell’s PCs are made by electronic order and are delivered directly to its customers. They have eliminated the middleman within their supply chain and have also exemplified an innovative business model through their effective SCM. Dell Computers continues to enhance and broaden its competitive advantage by integrating the internet into its entire business process, including online sales, procurement, customer support and relationship management (David et. al, 2004).

This paper first discusses the history of SCM and its synergistic meanings. Next, the impact of internet and ERP technology on SCM and further discuss the case of Dell Computer’s SCM

### **Research Methodology**

This research uses case study methodology as well as a literature review of the articles published in the last 10 years was also done. The null hypothesis is “technology implementations have a greater impact on firms supply chain and information sharing”. The alternate hypothesis is “conventional supply chain i.e. without using an effective technology, have slow or sluggish information sharing”.

The use of case study methodology permits a detailed and in-depth examination that is not possible in a wide sectional study (Sridharan *et al.*, 2005). Motwani *et al.* (2002) uses case methodology to examine the factors that impact the success of ERP implementation project. Wong (1999) uses cases to demonstrate the necessity of effective partnering relationship between supply chain members.

### **History of SCM**

It was developed somewhat 20 years in the past. Prior to 1980s most organizations worked fairly independent of their suppliers (Susan, 2005). The birth of SCM as an initiative that quick response program and the grocery industry’s efficient consumer response initiatives (Lummus and Vokurka, 1999). In 1982 Wal-Mart put bar-code readers on all of its goods and put scanners in all its stores. They updated the inventory numbers for individual items at the point of sale and enabled headquarters to more easily aggregate sales and inventory data at its centralized IT department. And in 1990, the retailer implemented a collaborative planning, forecasting and replenishment process that brought suppliers and distributors together to build a combined

planning calendar (Johnson, 2002). By the mid to late 1990s, the importance of SCM was organized. The Supply-Chain Council (SCC), organized in 1996 by Pittiglio Rabin Todd & McGrath companies ([www.supplychain.org](http://www.supplychain.org)), now includes 1,000 corporate members worldwide in a broad cross-section of industries, including manufacturers, services, distributors, and retailers (Susan, 2005).

By the late 1990s academic institutions also began to recognize the significance of SCM. In 1997 Michigan State University consolidated their Marketing and Logistics Administration Department with many of their operations and purchasing professors into a new department called Marketing and Supply Chain Management. In 1998 Arizona State University established a Supply Chain Management Department by merging purchasing, operations and logistics faculty along with some other (Larson and Rogers, 1998). In the same year i.e. 1997, journals regarding SCM were also introduced including *Supply Chain Management: An International Journal* and the *Supply Chain Management Review*. In the past SCM was only considered as a logistics network, however as the time passes competition increases, new rivals came into market, increase in substitute good, breaking organizations isolation and business starts operating globally, the value of SCM starts to increase. Today companies increasingly recognize that improved management of supply chains can be a source of competitive advantage. As a result, many have recognized purchasing and logistics functions into SCM organizations (Kanakamedala *et al.*, 2003).

### **Defining SCM**

The working of the SCM can be better described by understanding its synergistic meanings. We can look at the term “Supply Chain Management”, by analyzing the definitions of its individual components.

The word “*supply*” can be define as provide, issue, add or an amount of something available to use. However the word “*supply*” is used as an adjective in the term “Supply Chain Management”; transformed from its pure meaning as a noun and verb. “As a verb, it means to provide for or satisfy needs and wishes and as a noun it means the act to filling a want or need” (Merriam-Webster, 1973). These definitions pursue that there is someone who determines needs and wishes (Susan, 2005). We can state that “supply” is the process of supplying raw materials and goods, provided in the reaction of needs and wants which were created by the customer. We suggest that usage of the “supply” often refers fulfilment of needs.

The term “*chain*” refers “a series of usually metal links or rings connected to or fitted into one another and used for various purposes, a series of links used or worn as an ornament, a series of things linked, connected, or associated together” (Merriam-Webster, 1973). A chain typically implies linear, sequential relationships from one link to the next. When the term was coined, sequential information processing existed due to information limitations. But these limitations no longer exist (Susan, 2005) due to the advancement in technology.

The third term “*management*” is defined as “the act or act of managing control, directions; judicious use of a means to accomplish an ends” (Merriam-Webster, 1973). Management refers to the process of getting activities completed efficiently and effectively with and through people. It includes the functions of planning, organization, leading and controlling (Robbins and Colter, 1996). Thus, SCM refers to the process of completing fulfillment functions efficiently and effectively.

Together the synergistic term defines a new field of endeavour. The term “supply chain management” was coined by Keith Oliver, a Booz Allen Hamilton executive in 1982 (Information Week, 2003). The original meaning of the term was the “management of a chain of supply as though it were a single entity, not a group of disparate functions”, and was coined to address the suboptimal deployment of inventory and capacity caused by inherent conflicts among functional groups within a company (Laseter and Oliver, 2003). Supply chain is a term “now

commonly used internationally encompasses every effort involved in producing and delivering a final product of service, from the supplier's supplier to the customer's customer" (SCC, 2005). Thus SCM combine to refer to the combination of processes to manage the total flow of a distribution channel from supplier to ultimate customer. SCM is defined as "the coordinated flow of material and products across the enterprise and with trading partners. But it also includes the management of information flows, cash flow and work flow".

### Technology affecting the SCM

Describing the technological affects on SCM, how it helps the organizations to well manage the communication between the supply chain partners. Before the advancement of technology, companies were bounded in a sense that they were not able to receive or to send updates, feedback, or other important information in a timely fashion. Since the 1990s, the pervasive adoption of Internet and Web technology have promised a ubiquitous and less costly way to the companies and their business partners together in the supply chain. The great collaboration made e-Commerce buzzwords like "B2B" and "B2C" known to almost everybody in business circles. With the advancement of information technology, the collaboration of business partners will continuously improve the effectiveness of SCM.

### Conventional Procedure of SCM

In tradition supply chain consists of 4 major nodes, i.e. suppliers, manufacturers, distributors and customers. In some cases organizations become their own distributors or setting up there own distribution department within the organization, which can cause to eliminate the distributor node. First, the supplier supplies the raw material to the manufacturer, according to the requirement of quality and quantity of the organization. Second, the manufacturers manufacture the products according to the customers' requirements, do the packaging and handle it to the distributors for the distribution in the market. In this context the flow of physical goods remains from supplier through manufacturer and distributor toward the customer.

The feedbacks from the customer flows in a reverse direction i.e. from the customer to distributor and then to the manufacturer. Manufacturers altered their products according customer requirements and ask for the changes in raw material (if necessary) from the supplier. The information helps in making products and providing services according to the customer's requirements. The sequential flow of information is a time-consuming process, as depict in Fig. 1.

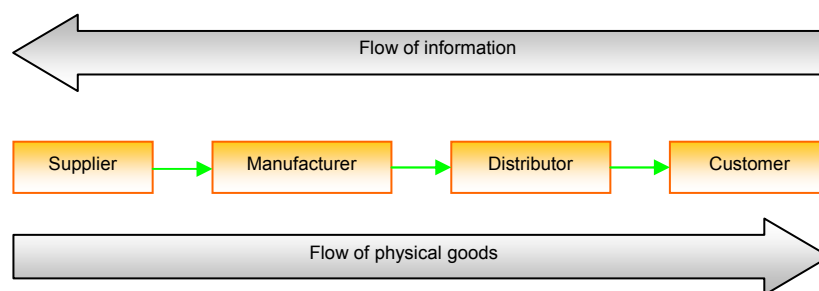


Fig. 1: Describing the working of conventional SCM

This rapid information sharing among the partners is very necessary. If it takes more time to reach the manufacturer, the manufacturer takes more time to produce products according to the customers' requirements. During this time period customer can switch to others substitute products present in the market. So, the weaker or sluggish information sharing among the partners of SCM can lead in reducing market share, losing cutting-cost advantage, especially when the business starts operating globally. Links and nodes spread out around the world, it

becomes essential to carefully coordinate the operations. The flow of information becomes sluggish, due to the long distances between the links. Sometimes it seems that various partners of SCM start working autonomous, showing less coordination between them. Major IT companies are now providing SCM solutions globally, to increase its productivity and efficiency, like IBM, Microsoft and Oracle.

**Changes in SCM**

*“As the economy changes, as competition becomes more global, it’s no longer company vs company but supply chain vs supply chain.”*

*Harold Sirkin, VP Boston Consulting Group*

We have seen before that the sharing of information among the partners of SCM is very essential. Information sharing is prerequisite for successful operations of supply chain (SC). Organizations can use technologies like internet and web that can enhance effective communication. Software that uses the internet can help every member of the supply chain review past performance, monitor current performance and predict when and how many certain goods need to be produced. Internet can help us in lowering the cost of SCM. Keeping in mind that in implementing the technology, sometimes organizations have to restructure their processes. However the primary goal of IT in the supply chain is to link the point of production seamlessly with the point of delivery, but it is highly depends on the way it is implemented. The internet changes the way companies do business (Short, 2002).

Many organizations are now providing software solutions for Supply Chain Management. In general the main core idea of implementing these solutions in the industry is to have a combine *shared database* by which sharing of information between the links on the SCM becomes easier and fast, as depict in Fig. 2.

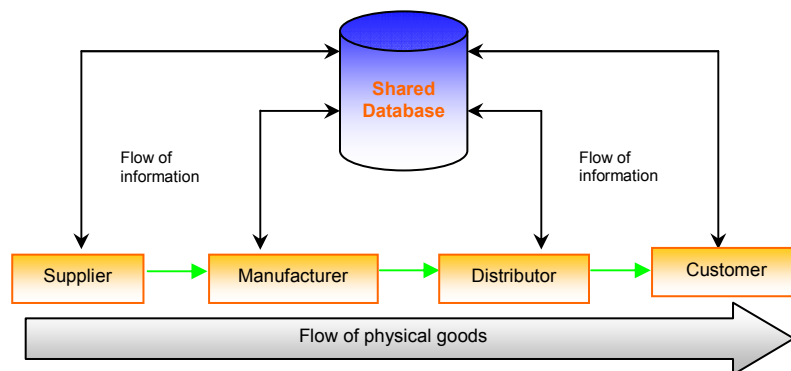


Fig. 2: Working of SCM after implementing technology

The Internet seems to be an extra distribution channel to most firms. In fact, the Internet and Web technologies can support the entire supply chain’s operations. Internet-based supply chain operations are fast inexpensive. Moreover, customers can instantly check the status of their orders by simply clicking their computer mouse. Corporate executives and managers can conduct real-time access to firm’s inventory level, and so do their suppliers and distributors (David *et al.*, 2004). Some of the solutions presently working in the industry are, implementing enterprise resource planning (ERP) software like SAP, electronic data interchange (EDI) and customer relationship management system (CRM).

**Dell: a case of effective web based supply chain management**

Dell computers survived the economic slowdown since March 2001. This phenomenon was the result of “Dell’s super efficient SC” (Millet, 2001). Dell computers was founded by Michael Dell in 1984 with a simple concept: by selling computer systems directly to customers, Dell could best understand their needs and efficiently provide the most effective computing solutions to meet those needs. This direct business model eliminated retailers; it can distribute computers much more quickly than the slow-moving, indirect distribution channels (Dell Computer, 2002a).

Dell Computers Corporation has become famous for its use of the web to sell customer configured computers to individuals and businesses. It has also used technology enabled supply chain management to create value for its customer. Dell gives its customers exactly what they want and thereby has reduced its inventories from three weeks sales to six days sales. Dell personifies Ranadive’s message about piling up profits on the side while creating customer value. By increasing the amount of information it has about its customer, Dell has been able to dramatically reduce the amount of inventory it must hold. Dell shares this information with members of its supply chain.

Dell’s top suppliers have access to a secure website that lets them see Dell’s latest sales forecast along with other information about planned product changes, defect rates, and warranty claims. The website lets the suppliers find out who Dell’s customers are and what they are buying. All this information lets these tier one suppliers plan their production much better than they could otherwise. The information sharing goes in both directions in Dell’s supply chain: tier one suppliers are required to provide Dell with current information about their defect rates and production problems. As a result, all members of the supply chain work together to reduce inventories, increase quality, and create customer value (Schneider and Perry, 2000).

The increased in communications capabilities offered by the internet is an important force that is driving the adoption of supply chain management techniques in a variety of industries.

***The outcome***

Dell surpassed Compaq to become the No.1 PC maker in the world in 2001. Dell’s success should be attributed to its direct-sales model and the utilization of effective SCM. The resulting efficiency ratios such as inventory turnovers and plant utilization placed Dell in an advantageous position, which encouraged consolidation among competitors to achieve the same level of efficiency. Although the slow PC market forced Dell’s revenue to drop, its core competency in SCM helped Dell manage 15 percent increase in product shipments as industry volume dropped 5 percent in 2001 (Serwar, 2002).

***Integration of SCM and ERP***

Technologically, ERP is said to be the backbone of SCM. Therefore, ERP systems, has evolved to play an integrated supporting role in the creation of a value chain. ERP get rid of 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 to those old standalone systems. Thus, finance, manufacturing and warehouse all still get their own software – the difference is that, within the ERP system, the software is linked together, so that, for example, a user in the finance department can look up warehouse information to see whether an order has been shipped. ERP software is normally flexible enough to allow a customer to implement only those modules needed without buying the whole package. Thus, expensive, it is often possible to phase the required investment (Dawson, 2002).

SAP (systems, application and products in data processing) is an integrated business system, which evolved from a concept first developed by the five former IBM systems engineers in 1972. It is a software package designed to enable businesses to effectively and efficiently run a

variety of business processes within a single integrated system. SAP software is deployed at more than 22,000 business installations in more than 100 countries and is currently used by companies of all sizes, including more than half of the world's 500 top companies (SAP AG Corporate Overview, 2000). Today, many large companies have standardised their business on ERP systems. For instance, Price Water house Cooper, Dow Chemical, Du Pont, Eastman, Monsanto, and Hoechst are all SAP users (Rick, 1997). The SAP R/3 standard, the leading ERP system, facilitates information integration between the individual information systems, reduces information cost, and enhances its value (Österle *et al.*, 2000).

### Conclusion

In the twenty-first century, firms cannot operate as autonomous entities but as participants in integrated supply chains. In order to meet customers' demand and expectations firms have to try their best to shorten product development, reduce cost and prices, improve quality and speed up their distribution. For fast information sharing among the entities of SC organizations can use a shared database system. Fortunately, the Internet and ERP systems are there to facilitate these challenges. The SCM evolves in the information age, the internet support fast coordination among the partners enhancing the SCM's performance which is also an essential part of e-Commerce. As a successful SCM model, Dell Computers, through its efficient SCM and built-to-order business model, gained a great success in 1990s. The big return on ERP investment and the future revenue profit growth comes from integrating the organization to the entire supply chain. An organization can compete in the market, based on the overall strength of its Supply Chain. However, technologies are available, yet we see slow progress in their adoption, specifically in developing countries.

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