
# Benefits of Extranet in Supply Chain Management

by

Ms. Chanika Jiarapath

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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# ABSTRACT

The purpose of this project is to analyze in how Extranets are used in supply chain management. This project studies an Extranet use in the supply chain by using Cisco System and Dell Computer Corporation to be the case studies, to show its advantages, its disadvantages and cross analysis in comparing between the case studies. This project is based on both traditional supply chain management and more recent literature.

It seems as if this Extranet differs to some extent from what the literature suggests, probably partly because of the already established relationship between the trading in the system than their clients. The Extranet discussion seems, however, to be successful since many positive views were brought to surface, but with relatively few negative aspects. This project is a qualitative research based on case studies and interviews.

# ACKNOWLEDGEMENTS

Several people have made contributions to this project. The writer would like to acknowledge their efforts and thank them for their contributions.

I would like to give 'A Special Thanks' to my advisor, A. Chiayoot Chamnanlertkit for his support and his time to discuss and review all my report. He gave me a lot of ideas and the way to work and get the information.

I extend my sincere thanks to the IT staff of Cisco and IT staff of Dell who always answered my questions and gave the good suggestions for my research. Thanks to my friends who answered all my questions and gave some suggestions for my project.

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# I. INTRODUCTION

In many ways the Internet represents a paradigm shift for business. The ease of comparison for suppliers and customers of a business leads to ever increasing pressure on companies to reduce their prices. Price based competition is not possible for the majority of companies due to their lack of dominant market share. Decreasing costs through increased efficiency is one way for businesses to add value for their customers while remaining competitive in this environment. Successful supply chain management results in cost savings for the companies, their suppliers and consumers. To Rodin (2001) "Companies no longer compete—supply chains do. It's supply chains that create competitive differentiation by how fast, how cheaply, and how well they deliver on customers' demands for products or services." The key to gaining competitive advantage through the supply chain is shared information. In fact, the proper view of a fully functional supply chain is a network of suppliers, distributors and customers (Scalet, 2001). The network view emphasizes the interrelated structure and information needs of a supply chain. How well a company implements this network will determine how successful their supply chain becomes.

The idea for companies to make business with other companies over a network occurred in the beginning in private networks but with the growth and increased popularity of the Internet the shift has turned towards the usage of a public networks. The benefits of the public network outnumber the benefits of the private network and have created a renaissance in the field of B2B electronic commerce.

The technology transfer supply chain includes a variety of functions such as identifying the needs of the technology recipient and managing the flows of information, physical goods, and finance. The technology suppliers perform some of

these functions. Thus the reason for investing B2B is because it will increase in importance in the future and contribute to the ongoing development of the Internet based economy often referred to as the new economy. As figure 1.1 indicates electronic commerce is estimated to grow massively and will contribute to $1500 billions of the total trading between companies in the world by 2004.

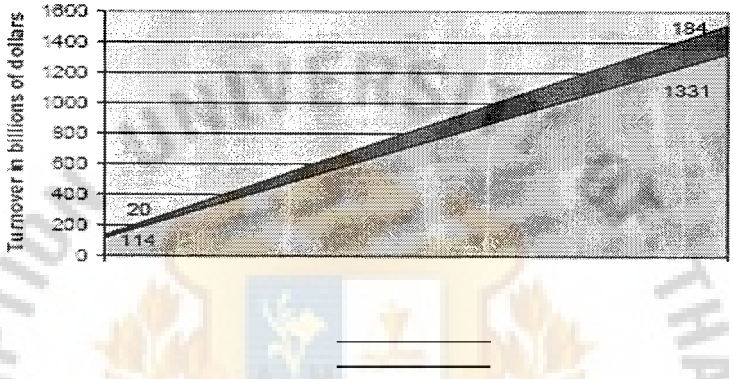


Figure 1.1. The estimated growth of B2B and B2C in the US, ForresterResearch,1999 (Cohen, 1999).

Clearly, e-commerce is making an impact on the ways that trading activities are being conducted. Much of the early literature on this subject was very speculative. However, the growth of e-commerce has enabled more observations to be made of the use of E-commerce by organizations. The literature is on the whole very enthusiastic about the benefits and excited about the prospects.

One area where B2B will have significant impact is in the management of supply chain. According to Skjoett-Larsen (2000) the focus of companies will be changed from internal efficiency in the logistic to external relations between the parties in the total supply chain. In other words Skjoett-Larsen argue that the largest potential for improvements is not found inside a company, but rather in the interfaces between

independent companies in the supply chain. The enhanced competition in the market place is forcing companies to consider strategies that reduce cost, and time constrains. According to Benjaminet al. (1986) e-commerce will reduce the cost of integrating customers and their suppliers. In order to cope with the competition companies are therefore looking for adopting more collaborative relations with their key suppliers, this in order to save time and money.

Clearly B2B influences the supply chain management, and it is also in this area where I will put my interest. Hence, in order to grasp what is happening at present in the field of B2B I believe it is important to understand what has happened in history. I am therefore going to present a brief history of B2B that will end up in an in-depth description of the latest way of conducting electronic commerce between companies over the Internet, namely the Extranet. (Ratnasingham, 1998) After exposing the reader to the history of B2B I will deepen my focus of its impact on supply chain management presented in the discussion of problems.

## 1.1 Background

As explained in the introduction, electronic commerce is becoming increasingly popular which stems from the benefit associated with it. Some of the benefits of implementing an electronic availability, inventory level, and transportation level and/or production requirements are made available in real time.

Other benefits, associated with the implementation of an e-commerce system, are illustrated in a study made by Kearney(1999) demonstrating that companies are loosing billions of dollars each year because of bad routines, domestic thinking when selecting and lack of grasping the opportunities of B2B e-commerce. The same study found that companies lower transactions cost, time and price by implementing B2B (figure 1.2).

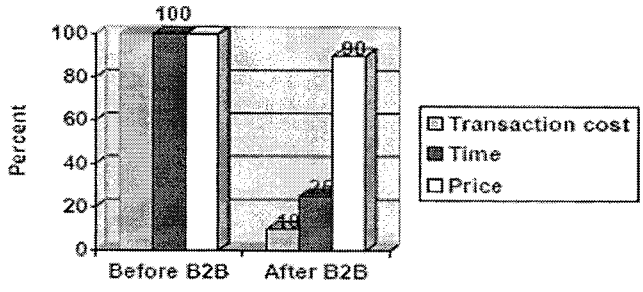


Figure 1.2. The change in price, Time from purchase to delivery and transaction cost by implementing B2B E-Commerce (Kearney, 2000 Cited in Ericsson)

The actual saving varies between industries and certain industries benefits more than others depending on the importance of purchase in that industry. In general though, the cost of transportation can be diminished and the barriers of long distances reduced in any industry.

Not only can the company reduce time and distance and create a slimmer supply chain by implementing Extranet, the collaborative planning among supply chain partners is made possible. Essential information can be shared concerning demand and production having the affect of speeding up research and development (R&D) and delivering the right product at the right time and right price. E-commerce effectively links customer demand and facilitate demand-driven (pull-strategy) supply chain operations. Despite the benefits of implementing e-commerce as a purchasing tool, some hurdles are holding it back and these includes for example security and legal issues.

1.1.1 The development of B2B e-commerce in a historical perspective

In the 1960s, the modem was invented which enabled computers to communicate over a telephone wire. Together with the possibility of connecting computers directly (direct wires) the B2B e-commerce was born and the first tumbling steps towards the

new economy were taken. The first system that connected companies together enabling company commerce was EDI. (Pawar and Driva, 2000) (Figure 1.3)

Electronic Data Interchange

EDI is defined as "the computer-to computer exchange of business documents in a standard, format between and among trading partners." (Emmelhainz, 1990) EDI has been used to establish links with the supply chain partners, thus contributing structural changes particularly to the business-to-business transactions of supply chains. EDI facilitates speedy and accurate information flow across supply chain and allows effective production scheduling. The system was first developed by the trucking industry in order to facilitate commerce between companies. Basically the system consisted of three types of actors. The net provider, the buyer of the goods and services and the supplier of the goods and services. Commonly the EDI consisted of one buyer (hub) that worked as the worked as the net provider and a number of suppliers (spokes).

Actors were now communicating with one another electronically by using computers that were interconnected by direct wires. The system was not connected to the Internet, and was only open for trading partners engaging in electronic commerce with each other. In other words if a new supplier wanted to enter the net, it had to apply for it, wires and software had to be installed etc. Since no infrastructure such as the Internet existed, it could be a costly effort. (Loshin, 1997) Along the way of system development, standards were set in order to enable communication between previously incompatible computers. Although more than six million companies were connected to EDI in North America, only about one hundred thousand were active users in 1996 according to EDI Group Limited. (Angeles, 2000)

The reasons for EDI being unsuccessful came from the expenses involved with it and the skewed power relationship between the hubs and the spokes. Some hubs used

their position influencing suppliers at each other, thereby undermining their bargaining positions. EDI was a closed system which meant that it was easier to keep track whom was using the system and when. Not only had the security made the system attractive it also integrated the users to a higher degree. When the benefits of the Intranet became clearer some companies decided to connect their networks to the Internet, (Zwass, 1996; Hanson, 2000), which provides a theoretical model of the interaction and difference between the public Internet, Intranet and Extranet.

Public Internet

The Internet consists of thousands of connected networks of computers all over the world operating on a standard protocol which allows data to be transferred between otherwise incompatible machines. The word itself means a "network of networks"). The Internet has its origin in the U.S. Department of Defense and was established in 1969 to provide a communications network for organizations engaged in defense-related research. Some years later researches in other fields began to establish their own network which was administered by the National Scientific Foundation (NSF). These two individual nets merged, creating the Internet in 1983. Today the NSF still maintains the networks, in corporation with the Internet Architecture Board, and the Internet Network Information Center, ("Internet", Encyclopedia Britannica On-line).

In 1992 the Internet developed into a public media when some students at the University of Illinois created Mosaic, which enabled people to post information and graphics on the Internet. This breakthrough on the Internet led to an increase in usage and Internet entered another stage of its life cycle. The new economy was founded. Along with the growth of the Internet, companies came to use it as a way of informing customers about their products and services. At first the information was on a one-way basis mainly distributing the infoiiiiation. Eventually the web site became participatory

and an interaction between customers and companies was created through two-way communication. Today the Internet has developed into a market place where customer and companies are meeting to make business.

The Internet is growing with approximately ten percent each month. Commercial use of the Internet is the fastest growing part of World Wide Web and managed properly, Internet can be implemented in order to gain competitive advantage in global markets. Many companies are therefore building Internet based strategies to support overall business development. (Hamill, 1997) The prerequisite for this to happen was the construction of a private network of information, or the Intranet.

The Intranet

As long as companies have been able to inter-connect their computers, Intranets have existed. Intranet is an internal network, similar to the Internet but smaller, containing databases and data about the company that is accessible only to authorized personal.

In order to explain the Intranet an example from real life will be given. The example given was presented in the international journal of educational management 1998 by McCrohan and Preston, 1998 at page 155.

> "A professor has his browser logged on to the academic faculty Intranet and with the click of a button views a colleague's syllabus. With the click of another button the professor downloads a web page displaying recent class cancellations. The professor then decides to update his or her existing syllabus and posts it for viewing on the academic student Intranet, A student using a lab computer decides to view his or her class's home page on the academic student Intranet and does so with the click of a button on the Netscape browser. All these functions were performed using WWW

browsers running on network computers. As such, the operation of Intranets does not require the development of additional networks."

According to Franklin (1997) the development of Intranet started with a company connecting their computers enabling e-mails and I continued with further development of cooperation between parties in a company. When finally the company decided to expand outside the company boundaries, the open or closed Extranet was created. With the enhanced usage of the Internet, the electronic commerce has shifted from the closed, standardized formats used in EDI, to the new c-commerce environment, represented by the Extranet.

The Extranet

The Internet can be said to belong to all its users whereas the Intranet solely belongs to the organization that maintains and uses it. (McCarthy, 1997) The Extranet is though, representing the bridge between the public Internet and the private corporate Intranet where the majority of business activity occurs. "Extranet is a slice of an Intranet that provides a public window into company services or collected data"

One can therefore argue that what is an Intranet for one company is an Extranet for another company as illustrated in Figure 1.3.

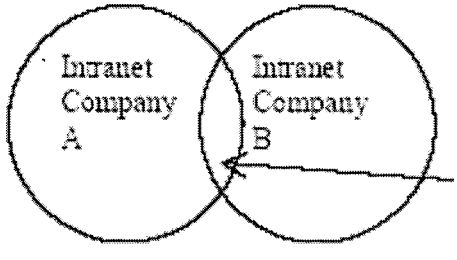


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Figure 1.3. The relation between Intranet, Extranet and Internet (Loshin, 1997).

The Extranet comes into function when the Intranet is opened up for external users. (Schwarzwalder, 1999) This can be done either by directly connecting computers on networks (EDI), or by connecting the Intranet to the Internet (Extranet). What the companies want to share with external actors and to whom they want to share it therefore depends on the nature of the company which is deciding to open up their Intranet by connecting it to the Internet. This requires certain security measurements that need to be implemented.

After the appropriate security systems have been put into function, the company has to decide, to what degree the system should be opened for external users, and what each user should be able to access.

To improve the actual understanding of what an Extranet is, an example is presented from real life that correlates to the example given about Intranet.

> "A professor accessed the academic faculty Extranet from his or her home computer and performs all the functions described on the Intranet example. An Extranet shares the same user interface and operates similarly to an Intranet. However, a user of an Extranet does not have to be located within the physical confines of the Intranet. The user can access the Extranet from any remote location via the Internet. As such, Intranets tend to be more secure because they are less vulnerable to outside attacks." (McCrohan and Preston, 1998)

It should be remembered though that the core idea of the Extranet for companies is actually to foster relationships between customers, trading partners or employees. The Extranet can therefore be said to function as an infrastructure where parties can settle deals and exchange infolination or in other words improving the supply chain management. (Loshin 1997)

## 1.2 Objective and research question

Extranet is a rather new study area and I will briefly cover some of the research that has been done, with the aim of discussing Extranet in supply chain management. Extranet is the latest development of B2B and it is the system most commonly used by companies. Extranet has brought a number of benefits by improving corporate efficiency, data flows and errors and actually reduced the need for personnel involved in orders and management and the ability to win new business or retain existing customers. This in turn has led to improvements in business efficiency, and the ability to respond to highly competitive new market entrants; reduced costs for paper and postage, reduction in money tied up in stock, decreased manual processing costs, and improved cash flow.

So far, prior research on B2B has focused on the evaluation of its operating benefits and has not identified factors which may have a significant impact on trading decisions. Fraster and McDonald (2000) present a theoretical framework that outlines the advantages and disadvantages with the use of Extranet. The study found out the importance for companies to be one step ahead of competition when developing Extranets. A number of researches have been carried out examining how Extranet has been implemented by companies and the factors affecting it.

In a study conducted by Chang and Swatman (2000) it was found that the major driving forces for implementing EDI differed from the one of Extranet. Companies were adopting EDI to achieve saving and improve efficiency, whereas implementation of Extranet came to be driven by a desire for greater supplier involvement and customer services. The reason for choosing Extranet as a study area rather than EDI is therefore obvious.

Studies by Frost (1998) and Flanagan (1997), examined the extent to which Extranets have been adopted and used by companies. Clearly it is not easy to implement

changes in organizations, as for example the introduction of Extranet. Pawar and Driva (2000) therefore argued that managers need a guide to support them in implementing technical changes such as Extranet in their organization. The guide (framework) presented was based on a number of studies made throughout the years by Twigg and Voss (1992) all covering areas of how technological changes are adopted by a company. The framework was developed at the University of Nottingham and tested in a variety of settings in European manufacturing organizations such as presented by Pawar and Driva (1997).

Many other aspects of Extranet have also been covered in previous studies such as security issues, managerial implication, how Extranets influences trading contacts, and ways of implementation among other things. With this as a background, it is obvious that it is a broad area to look at all the aspects of Extranets. I am therefore aiming toward broadening my knowledge in a certain area, namely supply chain management (SCM).

The reason for this is that changes in the supply chain profoundly affect how companies are interacting with one another. After all, one of the major changes in the inter-organizational process is occurring with the implementation of Extranet. I will therefore next discuss Extranet in SCM)

SCM is the co-ordination, integration and revenue maximization associated with the flow of products, services, information and money across trading partners. The objective of supply chain systems are multidimensional and include cost minimization, increased levels of service, deliver and response time. Before Extranet, the ability of firms to achieve these goals was limited according to Lancioni, Smith, Oliva (2000) which goes together with the arguments of Chang and Swatman.

Optimizing supply chain activities is critical to all industries since it saves money and increases revenues. Suppliers and customers cannot be treated in isolation. They are interrelated and must therefore be managed together to gain success for both parts. Information flows, (both internal and external), new product co-ordination and staff development are examples of what influences the supply chain strategy. Global networks (such as Internet, Extranet) have for long been discussed as a source of success in a world with increased competition, but it has never been more valid than today.

The use of the Extranet in SCM is a relatively recent phenomenon. There have been few, if any studies done on the use of the Extranet in SCM. The principal literature support comes from the descriptions of project of companies, on how they have utilized the Extranet in the management of their individual supply chains. Pawar and Driva (2000) have explored the effect of implementing Extranet in the supply chain. The study shows evidence that companies reduce operating cost and improve profit margins by the implementation of an Extranet. A core issue for a firm considering implementing an Extranet is to look at and understand the reasons for doing so. It will therefore be interesting to look into the advantages and disadvantages for SCM with the implementation of Extranet.

Extranet and communication technology such as Extranet, therefore, causes the need to rethink the business strategies and the use of technology and relations with trading partners. The new technology decreases the time and energy required for trade which decreases the friction between trading partners. This leads to a decrease in the number of partners since the search for the optimal source becomes less important. The best technology is decided upon with respect to the industries buying practices and the company's own relative power within the supply chain. (Saunders, 1994)

Although the benefits of Extranet are the same regardless of whom having implemented it, Extranets vary in nature, size of audience, sophistication, cost of technology and the extent of penetration of internal network resources.

Based on these studies and arguments, I am aiming to collect data from large companies.

Based on the problem discussion and keeping in mind the lack of previous, research the purpose of the study is *to analyze how Extranet is used in supply chains.*

(1) How can the use of Extranets in supply chain management be described?

(2) How can the advantages / benefits of Extranet in a supply chain be described?

(3) How can the disadvantages / risks of Extranet in a supply chain be described?

## 1.3 Methodology

A case study is empirical investigation looking at a contemporary phenomenon within its real-life context. Case study is preferred when examining events where the relevant behaviors cannot be manipulated. A common definition of case study is that it tries to illuminate decisions. Why the decisions were taken, how they were taken and the results of them are commonly studied. The characteristics of case study are that it is used for case where the descriptions of a phenomenon are focusing on details and deep descriptions. The possibilities to draw general conclusions to a population from these are therefore very small, if existing. Direct observation and personal interviewing are often used within this method.

This method is used for this research, mostly since no general conclusions are to be drawn. This study is also focusing on deep descriptions and interview with IT department, Cisco System and Dell Computer, staff to get their opinion and their

behavior in their extranet that use in supply chain management. The information and the other detail in this research come from many web site and white papers on the webs.

**1.4 Disposition of the project**

To provide the reader with an overview of the disposition of this project, a brief presentation of the chapters will next be given. I have given the introduction to the area that is to be studied; the following chapters will be:

(1) Introduction: this part is shown as the basic knowledge to help understand the basic concept.

(2) Literature review: where previous studies within the area of interest will be brought up.

(3) Case Study: where the case studies' data is presented for the reader.

(4) Analysis: which is done both by a within case analysis and a cross case analysis, e.g. the companies studied will be compared with both the theory and with one another.

(5) Finding and Conclusions: where the results are presented, following the structure of the research questions.

(6) Bibliography: where all information of the sources used in this project can be found.

# II. LITERATURE REVIEW

The literature review is organized for the description of the Extranet in Supply Chain Management.

## 2.1 Supply Chain Management

Supply chain management is the co-ordination, integration and revenue maximization associated with the flow of products, services, information and money across trading partners. There are very few raw materials that have the same ownership of goods from the source, to the time they are sold to the end customer. Most likely the materials pass through a number of companies whose role may be to transform, store or move material. In essence, a supply chain is a network of processing cells with the following characteristics: Supply, transformation and demand. (See Figure 2.1)

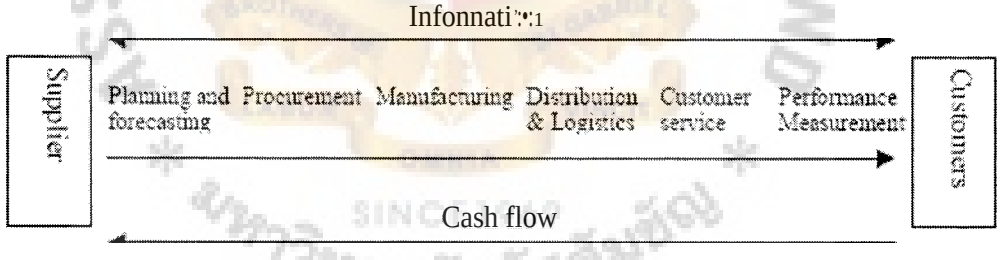


Figure 2.1. The supply chain (Spekman, Kamauff and Myhr, 1998).

Optimizing supply chain activities is critical to all industries since it saves money and increases revenues. According to Spekman, Kamauff, and Myhr (1998) suppliers and customers cannot be treated in isolation since they are interrelated and therefore must be managed together to gain success for both parts. Information flows, new

product co-ordination and staff developments are examples of what influences the supply chain strategy.

The supply chain takes an integrated, holistic approach to logistics management. It can be seen as a loop that starts and ends with the customer. Through the loop flow all materials, finished goods, information and transactions. In the last few years, the supply chain concept has been cheaper. The main barrier that remains to a full supply chain integration is about to disappear. (Pawar and Driva, 2000)

Since the aim of SCM is to improve the co-ordination, integration and revenue maximization, it is important to look at how each part of the supply chain is fulfilling its SCM objective.

Porter developed in 1985 the value chain. This is a framework for companies to critically analyze their activities for the purpose of realizing competitive advantage. In essence the value chain desegregates a firm into its strategically relevant activities in order to understand the behavior of costs for the purpose of control and more effective management. The concept is based on the premise that every firm is a collection of activities that are performed to design, produce, market, deliver, and support its product. Porter also derives the concept of "margin" which is the difference between total value and the collective cost of performing the value activities.

The Value Chain can therefore be said to be a tool that can be used by an organization to find ways to create more customer value. There are many activities performed in a company before selling a product. Design, marketing delivery and support of the product are just a few steps to consider, The Value Chain identifies five primary activities and four activities that are all relevant in creating value.

One of the primary activities is inbound logistics, where materials are brought into the organization. Operation logistics is converting this material into final products.

Outbound logistics is, as the name suggests, when the final products are delivered. The marketing of the product is the next step in the primary activities and the final one is service and sales of the products.

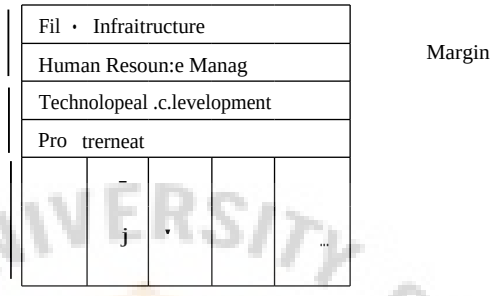


Figure 2.2. The Value Chain.

The supportive activities are firm infrastructure, human resource management, technological development, and procurement. Procurement is the purchasing of various inputs for each primary activity. The infrastructure support activity covers the costs of for example management, planning, finance, accounting and legal affairs. These are costs from all the primary and support activities.

The firm must examine costs and performances in all the value creating activities and to look for ways to improve it. Competitors can also be evaluated as benchmarks to find out possibilities for competitive advantages. The co-ordination of the different activities is of the utmost importance for the success of the organization. More emphasis must be placed on the smooth management of core business processes. These often involve cross-functional activities and include new-product realization process, inventory management process, order-to-remittance process, and customer service

process. Strong companies are those that develop superior capabilities in managing these core processes.

The traditional view of supply chain management is to influence the supply chain to achieve the lowest initial purchase price while assuring supply. Companies in the supply chain are often operating under competition and the fundamental assumption is therefore that trading partners are interchangeable and will take advantage if they become too important.

SCM can be used to develop competitive advantage by reducing investment without sacrificing customer satisfaction. Supply chain partners openly share information that facilitates their ability to meet end users needs. Companies have for long addressed the importance of having a good relationship with its largest customers. According to Helper, a sustainable supply chain strategy should not only focus downstream but also upstream. It is important to build close ties with key suppliers as well. Global networks have for long been discussed as a source of success in a world with increased competition, but it has never been more valuable than today.

2.2 Extranet and Supply Chain Management

How Internet influences the value added in the process of product development to every part in the value chain is looked upon by Lancaster and Walters. Their study concludes that it is only by pursuing a logical approach to the integration of information management into the strategy process that firms can become effective, world-class competitors. The studies concerning supply chain and value chain shows evidence that companies reduce operating costs and improve profit margins by the implementation of an Extranet. A study made by Moore addressed the importance of Extranet in improving supply chain management. The authors also argued that organizations, and in particular

managers, should take a look at the entire supply chain and identify area for revolutionary or evolutionary change.

Effective supply chain management is essential for a successful company. SCM can reach beyond the boundaries of a single company to share that information between suppliers, manufactures, distributors and retailers. This is where Internet and Extranet play an important role.

According to Graham and Hardaker, companies can by Extranet target new market by offering low entry costs, relatively minimal complexity with more flexibility and a convenient way in transacting business, By outsourcing and forming strategic alliances, companies provide an impetus to support the sharing of supplier, customer and corporate information, that was once proprietary with competitors and other cross industry players. The authors further argue that business are acting in an environment where sharing information among all participants is driving fundamental changes in the interaction, business practices, and operations of everyone involved. For example "the big three" automakers in the USA, launched the automotive networks exchange to further understand the impeding effects of electronic business communities. "The potential result will be a lower cost structure for the entire auto industry in which all participants will benefit. At the same time, such benefits will greatly modify the competitive strategies and interaction among all participants." (Graham and Hardaker)

The web gives all suppliers in a supply chain the opportunity to identify and co-ordinate data transfers with each other. It is proposed that, with marketspace reconfiguration of the traditional value proposition, SCM needs to manage the organizational complexity of adopting a dynamic mix and emphasis between content, context and infrastructure.

The process of innovation with the adopting of an integrated approach throughout the supply chain requires a trade off between autonomy and control, of which the balance decided upon, is unique to partner relationships. The organizational challenge of reaching an acceptable balance between autonomy and control is probably best achieved by the idea of subtle control.

The players must have access to a wide range of external technological services in order to operate effectively. Integration along the supply chain in the virtual market can be viewed as being a mix of both formal and loose integration mechanisms, similar to the Internet infrastructure. It is important though to remember that B2B includes organizations operating solely in marketspace and also those with a mix between the traditional marketplace and market space.

2.3 How is Extranet used in Supply Chain Management

According to Lancioni, Smith and Oliva, E-Business can be used in SCM in many different ways:

(1) On-line vendors catalogs from which buyers can find, select, and order items directly from suppliers without any human contact.

(2) The ability to track shipment and equipment using a wide variety of modes including trucks, rail, and air transport.

(3) The ability to contact vendors or buyers regarding customer service problems from late deliveries, stock-outs, alterations in scheduled shipment dates, late arrivals, and a wide variety of other service issues.

(4) The ability to reserve space in public warehouses for anticipated deliveries to markets locations.

(5) The ability to schedule outbound shipments from private and public distribution centers on a 24 hours basis.

(6) The ability to provide 7 days / 24 hours service to worldwide customers.

(7) The ability to receive orders from international customers.

(8) The ability to check the status of orders placed with vendors.

(9) The ability to notify vendors of changes in configurations in products that are produced to order.

(10) The ability to pay invoices electronically and to check outstanding debit balances.

(11) The ability to directly communicate with vendors, customers etc. regarding supply issues on a 7 days/ 24 hours basis via e-mail.

(12) The ability to be more responsive to customer service problems.

(13) The ability to schedule pickups and deliveries.

(14) The ability to reduce service costs and response time.

Source; Lancioni, Smith and Oliva

2.4 The Advantages of Extranet in SCM

A number of researches have been made in this area and creates a firm base to work from Anandrajan and Wen among others, all discuss advantages with Extranets. The authors mention, for example, cost savings, time reduction, faster communication, reliability and accuracy and improved corporation and customer service. The various advantages of E-Business in SCM are illustrated followed by a discussion.

2.4.1 Cost Savings

According to Anandrajan and Wen, the implementation of Extranet will reduce cost. Cost saving comes to a large extent from that electronic integration result in more consolidation and the use of a smaller number of suppliers. There is also a significant reduction in costs related to purchasing and dealing with suppliers. This means less time and paper work associated with co-ordination and warehousing, material handling,

scheduling and sales promotion. As explained, the Extranet enabled physical distribution networks to be simplified and the product to move directly from the supplier to the purchasing company. In other words the supply chain is affected.

The company can obtain significant cost savings due to the elimination of many middle parties that they no longer have to deal with. A shared database between partners is also a cost reducer since it reduces relevant costs of market research. In the last few years, the supply chain concept has been realized through advances in information technology. This has made electronic communication cheaper.

The Extranet has the ability to replace the telephone, personal meetings and fax machines. According to Burt and Felix, the return of investment (ROI) for an Extranet is between two hundred and one thousand percent. ROI is though something that is hard to measure since the concept of Extranet involves both hard and soft costs. Hard cost is money, whereas soft cost is intangible and involves time and ease of use. By implementing an open system the cost is low and little training of the employees is required since it is integrated into users' routine. The Extranet also increases speed and effectiveness of sharing information. Employees can work at home or from remote places when traveling.

The Extranet is used by industries to obtain competitive advantages. The usage improves the communication between business partners and reduces the costs when unnecessary middlemen are eliminated. Companies can offer improved services.

2.4.2 Time Reduction

In addition to cost reduction the Extranet also impacts the order cycle time between the producing company and its customers. A reduction in purchasing time allows for smaller orders to be placed more often resulting in lower inventory costs. With Extranet, savings can be made along the entire supply chain. Time saving can be

made since paper handling is more time consuming than electronic transmissions. The Internet has the potential to accomplish a key goal of supply chain management, which is to cut "cycle time", not in incremental steps, but in broad swaths, by completely cutting out queue time, move serially to all points in the supply chain, thus speeding up coordination among trading partners directly involved in specific transactions.

2.4.3 Improved Corporation

According to Graham and Hardaker, Extranet improves corporation in supply chain. The Extranet can be used by companies to obtain competitive advantages and improve the communication between business partners among other things.

The actual benefits of Extranets have had the affect of increased usage of electronic-medias in corporation and commerce between companies. The co-operation involves product development, production, logistic as well as finance. The Extranet can be used to provide the partners with information, improve the supply chain management, link the business partners tighter to the organization, build a knowledge pool and create an intellectual network. Extranets may result in single source sales channels.

Single source implies shared databases between companies who can use this common database for tracking customers. This will reduce not only the cost but improve the communication. Companies are pursuing more intensive and interactive relationships with their suppliers, collaborating in new product development, integrating key business processes and information sharing on a range of issues. With an improved communication in the development process time can be saved, and the best solutions can be reached quicker, when key infoimation can be shared more easily.

With an improved communication in the development, process time can be saved and the best solutions can be reached quicker, when key information can be shared more easily. Internet will, according to Manning, be used to higher extent in the future for

integration between industries and litigation will soon become standard procedure. The impact of e-commerce on the business-to-business sector is already manifesting itself in a number of different ways. However, the future will bring more dialogue between business and consumers on a number of levels within the supply chain that result in an even greater need to harness the benefits e-commerce can bring.

2.4.4 Improved customer service

Anandrajan and Wen address that the customer service for the participants in the supply chain with the implementation of Extranet. Extranet provides improved Customer service by giving grater access to information and decreased lead times. Orders can be processed quickly and shipments scheduled accurately.

The Extranet allows for the incorporation of more timely and accurate data into the company's planning and control system. Feedback mechanisms to report problems or complaints about purchased clothing or any related questions should be automatically forwardable to a corresponding web-based conference and these requests can then be managed throughout the Extranet to a point of resolution. Extranet allows multiple vendors, contractors and other contributors to the production process. In addition to reducing the number of suppliers, the Extranet reduces the costs of coordinating with suppliers.

The channel support, accessed by passwords, can strengthen the relationship with trading partners due to increased possibilities to check and place orders among other things. Global reach means that it is easier to cope with the increased need for relationship building. Extranet gives the customers 24 hours-a-day access, updated information and more focused target marketing efforts.

2.4.5 Faster communication

Faster communication is another advantage of introducing e-commerce. According to Pawar and Driva, it is clear that the greatest benefit seen through Extranet implementation is faster transactions. This is due to time being reduced and from better cash flow management. Debtors can be invoiced far quicker and more accurately using e-commerce. Experts observing B2B in bureaucracy plug the communication channels.

2.4.6 Reliability and Accuracy

According to Pawar and Driva, the chance of documents being lost with Extranet is getting lower as well as printing and re-keying errors to occur.

2.5 The Disadvantages of Extranet in SCM

The introduction of a new technology such as Extranet gives, as described above, many advantages to the company. Costs can be decreased, the number of partners reduced and it is possible to shift trading partners quickly among other things. More or less, everything in the world has, however, both advantages and disadvantages. Disadvantages with Extranets are problems with transmission speed, if a low number of accesses are possible at the same time, security, and price differences between markets and skeptical buyers among other things.

There are of course a number of other advantages and disadvantages with Extranet. Major disadvantages of Extranet use in SCM are presented followed by a discussion.

Security remains a barrier to widespread use. Other reservations about adopting e-commerce include, trading partners who are not ready, costs, training and personal contact. The hundreds of implementations of a purchasing system are according to Galle and MM, security and financial problems.

2.5.1 Lack of personal contact

According to Spekamn, Kamauff and Myhr, the personal contact between trading partners in the supply chain is changing. The personal contact of face to face is getting lower, E-Business lack in personal contact, which has its affect in the need of information.

2.5.2 Cultural Problems

Security remains a barrier to widespread use of Extranet. Security is the main concern when implementing an Extranet. The more vulnerable the information is in the B2B system, the more secure the system should be. Another problem with an open system like Extranet is that information sent over the Internet can pass through a network. Every coin has two sides and even if time and money can be saved, employees might have to go and previous good relationships may go down in the effort of maximizing profits.

2.5.3 Security Issues

Security remains a barrier to widespread use of Extranet. Security is the main concern when implementing an Extranet. The more vulnerable the information is in the B2B system, the more secure the system should be. Another problem with an open system like Extranet is that information sent over the Internet can pass through a network or router controlled by a business competitor. It is hard to control that access to the system, from where, to where and to what costs. Limitations of performance involved are reliability, scalability, security and perception.

Security is an important factor when implementing an Extranet and it is distinguished as disadvantageous for Extranet. A number of studies have explored security in B2B such as Desmarais, Lliadis and Oikononopoulos. These people's studies mainly explain different security solutions possible to improve the Extranet protection.

Wilson argues that trust towards technology and trading partners is an important factor in improving the security. Ratnasingham looks further into how trust influences the process of managing the security of an organization operating in an electronic commerce environment.

2.5.4 Cost of Implementation

The drawbacks of the Extranet are associated with the cost of purchasing and implementing the actual system. The main costs can be summarized in hardware costs, software costs, telecommunication costs, training costs and maintenance costs.

Hardware costs consist of mainframe and computer costs. Software costs are costs for the Extranet software, and tools to link this with already existing software. Telecommunication costs are the costs of accessing and using a value-added network, Training costs are related to training employees or change their existing work practices, and maintenance costs are costs linked to salaries of appropriately skilled technology people to maintain the network on a regular basis. There are, therefore, a lot of costs involved in the startup of an Extranet usage.

# HI. CASE STUDIES

## 3.1 Cisco System Inc.

Cisco Systems, Inc. is the worldwide leader in networking for the Internet. Cisco hardware, software, and service offerings are used to create Internet solutions that allow individuals, companies, and countries to increase productivity, improve customer satisfaction and strengthen competitive advantage. The Cisco name has become synonymous with the Internet, as well as with the productivity improvements that Internet business solutions provide.

Cisco System has developed a scalable business model that enables the company to meet the challenges posed by continued explosive business growth. It has created a new form of supply enterprise, termed an 'ecosystem' that seamlessly links together customers, employees, contract manufacturers and other supply chain partners into a multi-site, multi-location electronic network, based on the practices and technology of the Internet.

In Cisco's case, using the Internet to re-engineer the organization did not mean pasting a thin dot-com veneer on to a bricks-and-mortar company. However, in the words of Peter Solvik, Cisco's chief information officer, "it is about fundamentally transforming the company from the inside out". Cisco used Internet-based technology to transform its entire supply chain into an extended enterprise system-or what Cisco calls `an ecosystem'.

Cisco's Internet ecosystem seamlessly links customers, prospects, partners, suppliers and employees in a multi-party, multi-location electronic network. This e-network not only acts as the glue holding together all the internal operations of the supply chain, but also enables all the parties involved to present a unified face to the

outside world, with the result that all the working parts look and act as if they are one company. At the heart of Cisco's ecosystem are two portals:

(1) Cisco Connection Online (CCO)

(2) Manufacturing Connection Online (MCO)

3.1.1 Cisco's Sell-Side (Customer)—Cisco Connection Online (CCO)

By early 1996, customers could access technical help, reprint invoices, and search through product information without assistance, but they still had to talk with a sales representative whenever they wanted to buy something. Much of the time, this involved an initial phone call to place an order and more phone calls to make sure the order was accurately entered into the order queue. Only 75 percent of orders were entered correctly; the remaining 25 percent had to be re-entered.

As a result, Cisco started to think about how it could use the web as a purchase tool. In 1995 the company appointed an Internet Commerce Group (ICG) to look at different ways to leverage the Internet. The project was divided into three phases.

During Phase 1, the ICG analyzed the existing site and expanded its product offerings to include order-status capabilities, product configuration, and pricing as well as installation guides and technical tips. The group also analyzed call center calls and other customer requests. Research showed that most phone calls were focused on information housed in the Oracle ERP system.

In Phase 2, the ICG concluded that it could redesign the website to allow customers to configure and buy products. The e-commerce site was completed and launched in July 1996. By 1997, 27 percent of all orders were placed using the Internet, a much higher percentage than the ICG had expected. In addition, the CCO was rated among the top ten technology and computing websites by *Interactive Magazine.* Cisco described the site in its 1996 annual report as follows:

[Cisco Connection Online] provides customers, partners, suppliers, and employees with easy desktop access to a wealth of product information, software documentation, technical assistance, customer service applications, and interactive training.

Within the first four months online, Cisco had sold $75 million worth of products on the Internet. The site was simple but sophisticated enough to ensure products were accurately configured. As a result, Cisco was able to drop its customer-order error rate from 25 percent to 1 percent.

By 1997, 70,000 registered users were accessing the site 700,000 times a month. Although Cisco believed that the site was not as user-friendly as it could be, 60% of Cisco's technical support from customers and resellers was now delivered automatically via the web, saving Cisco close to $150 million a year. Better still, Cisco's customer satisfaction ratings were improving, Cisco was seeing internal productivity gains of 60 percent, and customers were seeing productivity gains of 20 percent. Nonetheless, Cisco was not satisfied.

In Phase 3, Cisco set out to address other concerns, including integrating its site with customers' ERP sites. Cisco attempted to produce a software product in house but, after an initial investment, discovered other companies were entering the marketplace with better products. After careful research, Cisco settled on a partnership with Ariba and Commerce One. As of this writing, Cisco was working with Ariba to expand its base offerings and make the product compatible with the Rosetta Net standards.

The CCO underwent considerable revisions and updates. Each time Cisco redesigned its website, it worked closely with the Internet Commerce Advisory Boards (ICABs), which included both Cisco employees and customers, and were used to perform market research on customers globally. Christian Treille, customer business

solutions manager and service provider, outlines how CCO has automated the customer ordering process:

> "Once the product is configured, customers can obtain pricing information for their selection from the pricing agent. Order placement allows customers to drop their selections into a shopping cart in Cisco's virtual market-place. An invoice agent allows customers accounts payable staff to track invoices on-line. A service order agent lets users obtain information about specific service orders. This application also connects directly to the freight forwarder's tracking service so that customers can determine in real time exactly where their orders are in the shipping process."

As of August 2000, the site had 10 million pages and was available worldwide. The first few page levels were translated into various languages, such as Japanese. However, all prices were quoted in the appropriate currency, based on an accurate exchange rate.

**The Advantages of Extranet in Supply Chain**

Customer Connection Online is essentially a web portal to information stored in Cisco's enterprise resource planning [ERP] databases, legacy systems and client/server systems, and acts as a comprehensive resource for its customers, resellers, suppliers and partners.

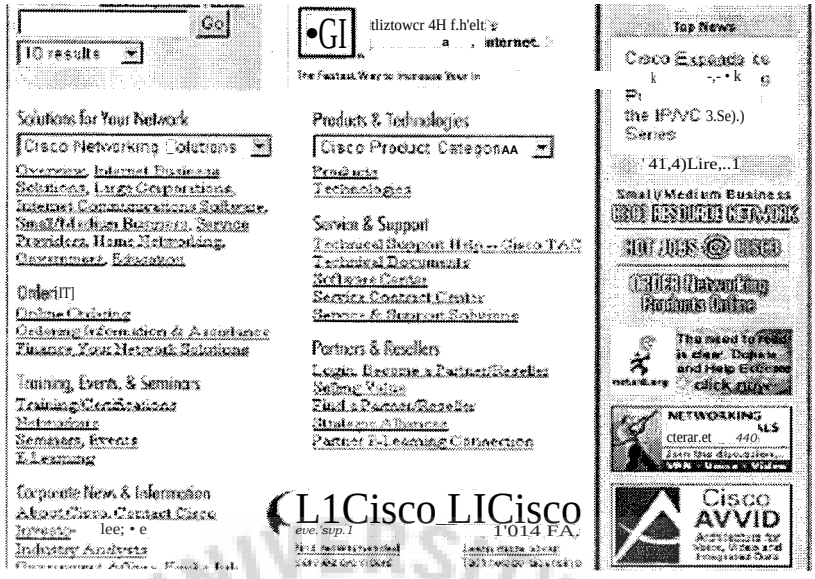


Figure 3.1. Cisco Connection Online's web page.

CCO has four key components and each of the components can make the advantage to Cisco:

(1) Market-place: a dynamic on-line catalogue used by more than 10,000 authorized representatives of direct customers and partners to configure Cisco products on-line. It contains a suite of applications for order processing that enables customers to configure, price, route and submit orders.

(2) Status Agent: gives Cisco's salesforce, direct customers and partners immediate access to critical information on the status of orders.

(3) Customer Service: for non-technical information to improve customer service.

(4) Technical Assistance and Software Library: improve the customer service.

In the past, one-third of all faxed orders contained errors that delayed processing. With the introduction of CCO, customers rarely make purchasing mistakes. After

customers plug in their Cisco configuration and account information, the system will alert them if, for example, they have selected software that is not compatible with their hardware.

CCO has allowed the company to lower the overall cost of taking orders, as well as minimize customer frustration. By automatically capturing orders at the configuration stage, Cisco has reduced the number of orders that require reworking from 15 percent to less than 2 percent.

According to James Crowther, customer business solutions manager, "CCO is a conductor of information" For example, on the day a product is introduced, all of its documentation — from manual to marketing to press releases — is immediately posted on CCO. Customers can report problems and submit queries. The bug Alert feature is posted on CCO. Customers can report problem within 24 hours of discovery. Customers can search the bug navigator to find information on specific problems.

Through CCO, Cisco is able to eliminate many sundry expenses. In the past Cisco would send software purchases to its customers on CD, delivered overnight by a freight forwarder. Now, the Technical Assistance and Software Library site enables customers to simply download software over the Internet, Over 50 percent of Cisco's software upgrades are delivered via Internet — in excess of 20,000 per week. In 1999, Cisco saved over $500,000 per year in freight forwarding charges.

Over 90 percent of the company's orders are now received via CCO. In fact, Crowther puts the figure as high as 98 percent for some business areas of Cisco EMEA (Europe, Middle East and Asia). Considering that Cisco's global sales revenues totaled over US$12 billion in 1999, CCO may well be the world's most valuable website.

**The Disadvantages of Extranet in Supply Chain**

The feedback of CCO system that Cisco got from their sales force and customers were that Cisco was difficult to do business with because of how complex the ordering process was. This is a disadvantage because Cisco's major competitors do not build to order; they were able to fill orders faster and with a lower hassle factor. "Productivity in our customer purchasing centers is very low. They had to do all these change orders just to get it right," says Elizalde, senior manager of networked commerce within Cisco's Customer Advocacy organization. Customers were increasingly frustrated with having to talk to several employees to place one order.

Improving the order management process via the Web was a natural solution. Adding a tool to help customers configure their orders and catch errors on the fly was at the top of the list Elizalde handed off to Chris Sinton, director of Cisco's Web site, Cisco Connection Online and the company's intranet, Cisco Employee Connection. Online pricing information was another big wish-list item. Keeping that information up-to-date on paper was practically impossible, creating yet another source of customer frustration. Customers also wanted to check order status themselves without making multiple calls.

But adding a transactional commerce application to the Web site involved some risk. For one thing, everyone was initially confused about whether adding online purchasing ability meant Cisco had added a new sales channel. Neither the internal sales representatives nor the reseller partners were at all sure they liked that idea because they could face losing commissions for orders placed on the Web. "They were very threatened by the idea," says Sinton. So he and Elizalde sprang into action, dissecting the sales side's concerns and finding mutually agreeable solutions. "We had a three-part

strategy for getting everyone's buy-in," says Elizalde with a chuckle. "We sat down, asked them what they wanted, and then we did it."

To wit, they made it clear that the new commerce application on Cisco Connection was not going to be a new sales channel. Regional salespeople would receive full commissions for any orders placed online. And, most important, only existing direct customers and sales partners would be able to purchase online. Would-be first-time buyers would be sent to local sales representatives to begin building relationships.

"We are very tightly in synch at this point, and we need less formal coordination," says Elizalde. Since the addition of the commerce application to Cisco Connection in August 1996, the skyrocketing usage rates and value of goods sold online are testament to its success. Three months after the launch, the run rate of orders received through the commerce application was 4 percent. Today, Cisco Connection Online sells $9 million worth of equipment online every day, accounting for 40 percent of Cisco's annual revenue.

3.1.2 Cisco's Buy-Side (Supplier)—Cisco Manufacturing On-line (MCO)

Cisco's Manufacturing Connection Online (MCO) has been crucial in allowing Cisco to scale. Just as Cisco had problems hiring enough engineers and customer service represents, it also had long been plagued by problems scaling its manufacturing operations sufficiently to meet the surging demand for its products. Faced with a choice of limiting growth or outsourcing manufacturing, Cisco chose to outsource.

Originally, Cisco used contract manufacturers. Cisco forwarded orders, warehoused the components, and performed final assembly and testing before shipping finished goods to its customers. But warehousing and maintaining a large inventory were expensive. In order to cut inventory costs and improve customer delivery times,

Cisco began to cultivate closer relationships with its suppliers. It sought integrated partners, not just suppliers.

Cisco asked these partners and contract manufacturers to integrate and network their supply chains with its own. The result was an automated order fulfillment process. The MCO, launched in June 1998, became the facilitator, allowing Cisco's partners direct access to customer information, sales projections, and product specifications. Partners could also alert Cisco to work stoppages, part shortages, and other issues.

Once a customer placed an order on the Cisco.com site, the manufacturing partner was immediately notified. Each order was issued a specific order number and product number, and all orders were customized. Once the manufacturing partner received the information electronically, the order was sent to the assembly line and placed in the queue—all without human intervention. The manufacturer then built the product to order.

Initially, Cisco preferred to retain the final testing and certification processes on site. However, with the advance of competitors like Nortel, time-to-market and delivery speed became critical differentiators. Again, Cisco looked to the Internet to improve its competitive advantage.

The phrase "virtual manufacturing" is commonly used throughout Cisco. As Pete Rukavina, Cisco's direct of global supply chain management, points out:

> "For every Cisco manufacturing employee there are six virtual manufacturing employees who use Cisco processes, which are measured against. Cisco processes, which are measured against Cisco metrics, and are located around the world."

In explaining the concept of virtual manufacturing employees, Treille cites Jabil, one of Cisco contract manufacturers, located in Scotland, as an example:

"Their employees follow Cisco processes and manufacture product as if produced by Cisco's own employees, even though they are still on Jabil's payroll. So, for example, Material management, dynamic replenishment and quality assurance are down as Jabil employees using Cisco-developed and Cisco-controlled processes and systems."

This new impetus inspired the creation of the Cisco Systems Auto Test. The system tested products to ensure they were up to Cisco's specifications and ready to ship. This usually took less than three days. Once an order was ready for shipment, Federal Express, Cisco's shipping partner, was automatically alerted, the order was assigned a shipping number, picked up at the manufacturer, and delivered by Federal Express to the customer. In the event of an assembly line problem or auto test concern, the manufacturer immediately alerted Cisco through the MCO, which then alerted the customer.

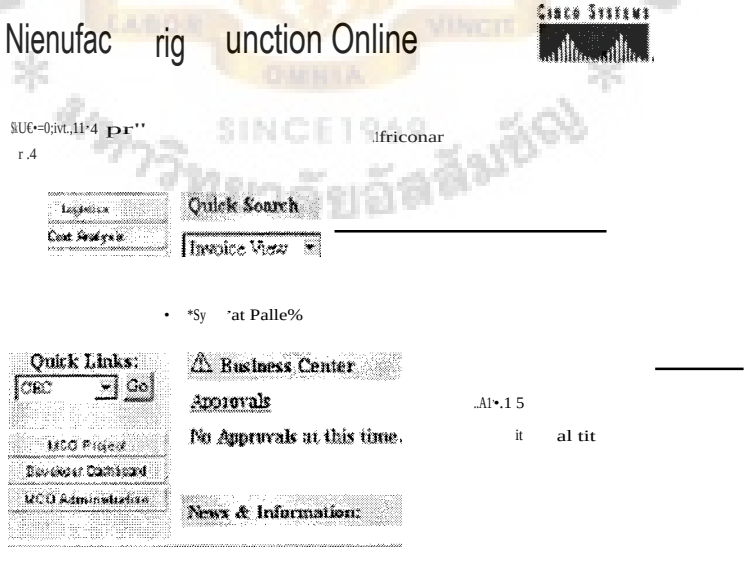


Figure 3.2. Manufacturing Connection Online's web page.

**The Advantages of Extranet in Supply Chain**

Cisco's manufacturing system incorporates 34 plants globally, of which only two are owned by the company. The result is a significant contribution to Cisco's bottom line. The company estimates that in 2000 it saved up to US$800 million compared to what it would have cost to own and operate all 34 manufacturing plants.

Cisco's suppliers not only make all of the components and perform 90 percent of the sub-assembly work, but they also undertake 55 percent of the final assembly. Thus, suppliers regularly ship finished Cisco hardware to Cisco customers without a Cisco employee even touching the product. In the words of Cisco executive vice president, Don Lustwin, "you have heard of just-in-time manufacturing, well this is not-at-all manufacturing".

Treille is keen to stress that although process control is centralized as a consequence of the single enterprise system, actual execution is decentralized. One example of centralized process control / decentralized execution is automatic testing. In order to ensure product quality, Cisco has installed automated test cells on all Cisco-dedicated supplier production lines. There are currently 950 test cells worldwide using Cisco-developed technologies to automatically configure test procedures for each specific customer order. The use of centrally controlled automatic testing has saved the company the need to deploy test engineers in supplier plants — equivalent to an annual cost saving of US$108 million.

Cisco's contract manufacturers, assemblers, distributors and logistics partners connect with Cisco through a supply chain extranet portal called Manufacturing Connection Online (MCO). First deployed in 1999, MCO enables Cisco and its partners to access real-time manufacturing information including data on demand forecasts, inventory and purchase orders. According to Treille:

"Creating MCO involved consolidating the access points of numerous manufacturing information systems into a single user interface. This gives us tremendous leverage. Direct fulfillment is a good example. By using MCO to access Cisco Enterprise Program (the company's ERP system), supply chain partners are able to directly monitor customer orders and ship product, without us actually touching an order. The system prompts Cisco to pay for the parts used.

By directly linking to our suppliers, we have streamlined procurement. That means no more paper purchase orders and no need to expedite delivery, and so purchasing teams can concentrate on more strategic activities such as partnership and business development. That is only one part of the benefit. By working with suppliers in a connected ecosystem we have cut delivery lead times, errors and inventory and improved customer satisfaction."

Through MCO, Cisco has also reduced the time-to-market for new products. Before the creation of an ecosystem-wide new product introduction (NPI) database, new products usually required four or five iterations of prototype design, with each prototype taking at least one week to complete. The NPI database has reduced the time spent collecting product information from one day to 15 minutes, plus a similar step-change saving in the time needed to disseminate it. Cisco believes that this type of positive impact on time-to-market generated an extra US$388 million in income during 2000.

The Disadvantages of Extranet in Supply Chain

The major disadvantages with Extranet are that no telephone contact will be used and that there is quite a long response time now and then. The latter comes from capacity problems with the World Wide Web according to Pete Rukavina. Treille says

that one disadvantage is that the prices can be seen, but he adds that this can be seen as an advantage in that it is a service for the customers.

The degree of personal contact is not affected very much for Cisco since there is mainly telephone contact going on between the company and its customers. The contact in general decreases though, which can be a disadvantage according to Pete. The possibility to become more proactive is thought to be very good according to Treille and this overweighs the disadvantages.

Treille continues to say that the culture in the company has not been affected by the introduction of an Extranet. The employees have always been open to new ideas, and no one has mentioned anything negative about the project. Pete says that in a long term perspective a new way of thinking is necessary. The management must make the whole organization understand that opening database is the best thing to do. The potential criticism within the whole organization must be met.

Both the interviewees argue that security is not a problem and that the customers are not worried either. In a worst case scenario, somebody else could see what is ordered but this is not as issue.

**3.2 Dell Computer Corporation**

Dell Computer was founded by Michael Dell in 1984, while he was a student at the University of Texas, Austin. Dell began by selling upgrades of IBM-compatible PCs and in 1985 began to sell its own brand of PCs. From the beginning, Dell operated on the direct sales model, taking orders over the phone and building PCs to the customers' specifications. Dell entered the retail PC channel for several years in the early 1990s, but a downturn in business in 1993 led it to return to its roots as a direct vendor (although the company does work with resellers in some markets).

More importantly, profits were soaring, thanks to the cost structure of the direct, build-to-order model. By turning its inventory over 60 times a year, Dell minimized the rapid depreciation costs that mark the PC industry, and by receiving payment from its customers before it paid its suppliers for components, Dell operated on a negative cash conversion cycle. This minimized Dell's working capital requirements and allowed it to achieve high rates of return on its invested capital. The result was an exceptional run for Dell's stock, which outperformed even stalwarts such as Microsoft and Intel in the 1990s

The build-to-order process has been carefully honed for years, and involves the entire production cycle and supply chain. Thus, a Dell PC is designed to minimize human touches in production, suppliers are selected to ensure high product quality, suppliers are physically integrated into production, and the entire order fulfillment process is managed by a sophisticated combination of internal and external infoimation systems.

Dell was an early and enthusiastic convert to the Internet, creating its first web site in 1994 and moving many of its business activities to the Internet ahead of its competitors. The company saw that its direct model gave it an advantage in selling online. Also its build-to-order manufacturing processes were already in place, making it easy to offer customers the opportunity to configure products online just as they already did on the telephone. At the heart of Dell's Extranet are two portals:

(1) Premi er.D ell. com

(2) Valuechain.D ell. com

3.2.1 Dell's sell-side (Customer) — Premier.Dell.com

In the beginning, convincing large corporate customers to buy through the Web was a challenge, and some customers felt Dell was asking them to radically change the way they purchased computers. To overcome this resistance, Dell studied how large customers evaluated and acquired systems, discovering a diversity of practices with no "one size fit all" solution. Additionally, most customers wanted different levels of access for different users. One with general information about approved configurations, order status, and pricing for all employees; one for the customer's purchasing staff with sales data and management reports; and one for the company's internal IT support staff, with more detailed technical information and access to Dell's personnel assigned to the account.

Thus, Dell designed customized Websites called "Dell Premier Pages" (later renamed "Premier.Dell.com") for its corporate customers. These pages would not only allow the customers to carry out standard transactions such as configuration, price quotes and purchasing, but they would also allow them to track orders and inventory in systematic detail and provide them with on-line asset management support. This did not mean the end of personal touch, though: the Account Executives and sales representatives were still in charge of the customer relationship, but now, they could focus on higher value-added tasks while the customers themselves carried out most routine procedures online.

Initially, Dell focused on its largest "platinum" accounts, then adding the "gold" accounts and moving down. In fall 1997, Dell developed Premier Pages that could scale by the thousands using software tools that allowed a sales team to develop a new customized Premier site in less than a day. This enabled Dell to extend the program to medium-and small-sized businesses. In early 2001, Dell had more than 60,000

customized Premier sites, and it was planning to offer a Premier Dell.com site for every customer who has an agreement with Dell.

This online support application is a virtual helpdesk that allows you direct access to essentially the same tools used by our award-winning Technical Support Staff.

Dell Premier Support Features include:

(1) System Configuration Detail: Allows customers to view the exact system configuration detail as shipped from Dell. Comprehensive information includes SKU-level detail, part numbers and warranty information.

(2) Service Call Status: Keep up to date with the latest information about system service incidents. With Service Call Status, customers have the ability to view the status of Next Business Day and Four Hour service calls, as well as Parts Only and Premier Access parts shipments. Customers also have the option of viewing all incidents that are currently "open".

(3) Customize Your Support Options: Specify exactly what Dell systems you support by customizing your Systems List and storing Service Tags for easy access. Dell Service Tags are a unique system identifier and enable you to pull up system-specific information.

(4) Top Technical Issues and FAQs by Product: View information, documentation and troubleshooting applications on your system by product.

(5) Automated Notifications: Register online to have updates about your system(s) sent via email. Notifications include:

   (a) Service Call Watch - Updated in real-time, this application will proactively notify registrants with update emails concerning Service Incidents

   (b) File Watch - Receive notices about new downloads for your system(s).

(c) Order Watch - Receive and e-mail to track the status of your single or multiple orders and view carrier shipping status.

(6) Communications Center: Email an online technician with your support question.

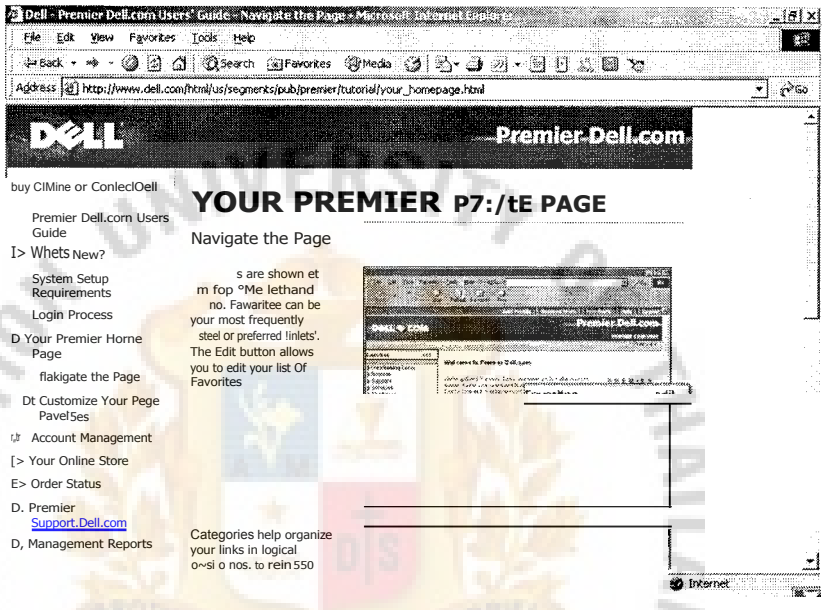


Figure 3.3. Premier.Dell.com's web page.

**The Advantages of Extranet use in SCM**

The major advantages of Premier.Dell.Com can be analyzed and listed with the following features:

**(1)** Automated purchasing: Corporate users ordered from pre-approved configurations at pre negotiated prices. Premier Dell could be used to confirm daily orders, order spare parts, check manufacturing status, order special labels, request internal system IDs and company logos, and request

special or company software to be added at Dell's factory. Special packages were also available for employee purchase programs for home use.

(2) Integration: To a corporate employee, the Premier Dell site appeared just as a part of their corporate Intranet.

(3) Facilitated Access: Premier included customized contact information for Dell's account and service and support team members assigned to the account, including telephone numbers, e-mail addresses and pager numbers.

(4) Centralized control: Employees were given different levels of password protected access to the site, depending on their particular business needs. The purchasing process was customer-specific; in some cases, corporate employees were authorized to order directly from Dell, whereas in other cases employees were required to route purchase orders through the company's internal purchasing department, which in turn ordered from Dell.

(5) Management reporting: Customers could use their Premier site to obtain management reports to track orders and deliveries, to itemize and summarize computer expenditures, and to manage their PC assets.

**The Disadvantage of Extranet in supply chain management**

The respondent argues that it takes a bit longer time when ordering with the Premiere.Dell.Com system, especially with the long time it takes to access the World Wide Web sometimes and that this is a disadvantage with Extranet.

The lack of telephone contact is a pity according to Dell, but he argues that they call each other nevertheless between the companies to make sure that everything is in order since the system is still relatively new. This is neither an advantage, nor disadvantage to Dell. The respondent says that the contact in general has decreased and

that this is a shame, The Extranet has not affected the culture of the company according to the respondents.

Security is not an issue, especially since Dell has manual backup still. The trust between customer and Dell is unchanged and very high and there are no legal constrains for buying via Premier.Dell.Com according to the respondents.

There were no costs for Dell in introducing Premier.Dell.Com. It is only a new telephone line that had to be installed. The cost is therefore no disadvantage.

3.2.2 Dell's buy-side (Supplier) - Valuechain.dell.com

Dell started to use supply chain management software to reduce inventories, improve material management and enhance relationships with suppliers. Michael Dell believes that

> "The real potential lies in its [the Internet's] ability to transform relationships within the traditional supplier-vendor-customer chain and to create value that can be shared across organizational boundaries. The companies that position themselves to build information partnerships with suppliers and customers and make the Internet an integral part of their strategy not just an "add-on", have the potential to fundamentally change the face of global competition."

Three years ago, Dell began searching for ways to achieve greater efficiency in its operations. The company wanted to strengthen its supplier alliance and shorten the time suppliers would need to provide components to Dell from two or three days to six hours. Dell developed an Extranet, called valuechain.dell.com, a secure extranet that acts as a portal allowing Dell suppliers to collaborate in managing the supply chain with customized supplier Web pages.

As the world leader in direct computer systems and a premier supplier of Internet infrastructure technology, Dell Computer Corporation is widely recognized for its efficient build-to-order business model. Everyday, customers around the globe order customized systems from the dell.com website.

The Extranet allows suppliers to share real-time information with Dell on their capacities, inventories, quality metrics and costs, while Dell provides them with information on customer demand, product quality and technical customer requirements.

The supplier extranet was phased in gradually. One of the first suppliers to come on board was Intel, who shared inventory and demand information with Dell. This enabled Intel to provide Dell the right quantities of the newest components on time, and Dell — to use "fresh" components, a must when the technology changes so rapidly. In June 2000, most suppliers became electronically linked to Dell, gaining visibility into Dell's processes.

Today, Dell purchases almost 90 percent of its direct material supplies online. When the company builds a computer, components that are only a few hours old are delivered from supplier hubs co-located new manufacturing plants.

> "We are trying to draw more value out of our supplier relationship. That's why the name 'value chain' " says Dell's Michael Chong. "The applications themselves are not replacing the business processes. The business processes are already defined and well ingrained. It is just making the business processes more efficient."

Currently, Dell is expanding from the desktop computer market to enterprise computing, a move that involves building high-powered server computers, The company's expertise in selling over the Internet and efficient supplier network are critical if Dell is to drive better value for its customers, Chong says.

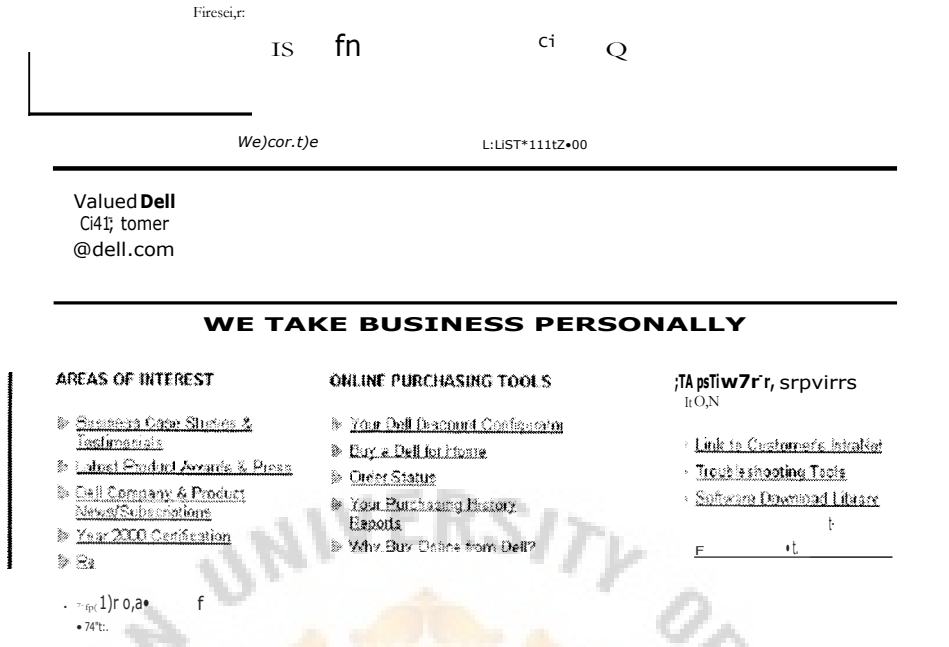


Figure 3.4. ValueChain.dell.com web page.

The Advantages of Extranet use in SCM

Michael Chong, extranet Technology Manager, Dell Computer Corporation said that "SCM shortens the cycle between the component, the manufacturer and the end customer. We are allowing them to almost touch each other."

Valuechain.Dell.Com provides suppliers with an 'eye' that can follow their material as it winds its way through Dell's operations. Suppliers can log-on, drop off invoices, check engineering change orders, review negotiated and forecasted cost reports, and track their overall performance. The Value chain solution also allows Dell's suppliers to benefits from more accurate access to future demand to assist in their own planning requirements.

Inventory control is important to any manufacturer. In the highly competitive computer industry, it is particularly crucial because the price of computers and components decline almost weekly. By tightening inventory controls, Dell can take advantage of industry price that manages that type of model because their inventory turns are fewer. They have more latent costs built into the components in terms of their inventory."

Three years ago, Dell worked with more than 1,000 suppliers. Today, that number has dropped to about 100 suppliers who receive orders worth approximately $26 billion every year. Dell's suppliers are able to predict upcoming demands and use supply chain data to work with their own suppliers. Saving can then trickle through the chain. "The key is to get it online so you are using those portals. Fax and human interface really can't provide the leverage that you need nor the consistency of data exchange." Chong says.

Dell's online supply management has also allowed the company to increase its collaboration with suppliers and customers. "Because we work directly with customers, we have the ability to connect and understand what products will be required and when" says Chong. "We can start the development cycle much more quickly with out partners. Whether it's a new midnight grey flat panel LCD because customers do not like the old beige or whatever color scheme, we can start to plan those components and share information with our suppliers many months in advance of the product actually coming to market."

The new system has also led to changes in the workplace. For example, former administrative and purchasing staff now fills new roles as supplier relationship managers. They can step in if a human touch is needed to resolve invoice discrepancies, ordering delays, or quality concerns.

Despite the success of Dell's Internet-based supply chain management, Chong is quick to point out that it is only one of the tools needed to build a manufacturing company. A major part of Dell's strength has been maintaining strong links with both customers and suppliers. "The real essence of a value chain is we are taking these business processes and automating them, but still adhering to the intrinsic quality of the products."

**The Disadvantages of Extranet use in SCM**

The fact that telephone contact decreases with the introduction of Extranet, is seen as a major disadvantage by Michael Chong. Another problem is that the data cannot be found for an order after 60 days. Chong could not come up with any disadvantages. The lack of personal contact is no problem according to Chong, but some respondents say that this level has remained the same. Chong says that the decreased contact that he perceives can avoid misunderstandings but on the other hand you cannot stress things and use probing to make sure the message was understood. Regarding the personal contact this has always been very limited.

The respondents do not see security as a problem. They are aware of the possible problems that might occur but they do not think they will run into problems with the system they use. Interruptions might occur but this is the case when someone is speaking on the phone as well.

This implementation of the valuechain.dell.com system was free for Dell. It is only the access to this World Wide Web that is paid for. Chong comments that the communication is still very slow, sometimes it can take up to one minute to access the system also with ISDN. The speed varies with the time of the day. Another comment from him is that it would be very helpful if the customer could get the information about what type of machine the Extranet fits to, in valuechain.dell.com.

# IV. ANALYSIS

In the following chapter, I will analyze the case studies. A within case study will be made following the order of the research questions. Regarding the within case study the data collected for each company will be compared with previous research brought up in my frame of reference. In cross analysis, the findings from each case will be compared between each other.

## 4.1 Extranet use in SCM

Lancioni, Smith and Oliva bring up several ways in how Extranet can be used in SCM. It is on these findings that part of the study is based upon.

### 4.1.1 Within-case Analysis of Cisco

Cisco's Extranet can be used in order to find, select and order items directly from suppliers without any human contact and that follows the arguments of Lancioni, Smith and Oliva (2000). By using Cisco's Extranet, it is also possible to track shipments and equipment.

Lancioni, Smith and Oliva state that Extranet can be used to contact vendors / buyers regarding customer service problems. This is, however, not possible using Extranet and it is therefore contradicting the theory. Up to date it is not possible to reserve space in public warehouses through the MCO system and there is no possibility to schedule shipments from distribution centers which also goes against the theory.

Lancioni, Smith and Oliva argue that Extranet can be used to provide 7 days/24 hours worldwide service. Peter Solvik, Cisco's chief information officer, agrees in the sense that the customers can place orders. However, he must later forward the order to the factory. In the future he will receive an SMS on his cellular phone, which he forwards without placing his foot in the office. CCO can, therefore only, partly be said

to fulfill the theory, since 24/7 service can only be given in the sense of ordering and not on other services.

According to Lancioni, Smith and Oliva, Extranet can offer the ability to receive orders from international customers. Cisco can receive any orders from international customers and distribute them to each market which usually has its own market company. In other words, the customers order their products from the market and in turn place orders from their district internationally. Therefore, it can be argued that the Extranet partly follows the literature.

It is possible to check the status of orders placed with vendors, as suggested by Lincioni, Smith and Oliva. Regarding the possibility to notify vendors of changes in product configurations, it is an issue today according to Cisco, which, therefore contradict Lancioni, Smith and Oliva statement of Extranet being used as a tool for notifying vendors of changes in product configurations. The authors also argue that an Extranet can be used to pay invoices electronically. It is, however, not possible for Cisco's extranet system, although it is possible to find out outstanding debit balance and pay through a bank using the World Wide Web.

Another issue brought up by Lancioni, Smith and Oliva, is the ability to directly communicate with vendors and customers via e-mail. This future is something Extranet offers according to the webmaster, however, arguing that it is no guarantee that the e-mail will be dealt with immediately.

About the ability to reduce service costs and response time, the respondents argue that the service costs are unchanged for both Cisco and the customers, even if the customers can decrease their stock.

Cisco's customers can use CCO's schedule pickups and deliveries which goes together with what Lancioni, Smith and Oliva argued.

4.1.2 Within-case Analysis of Dell Computer Corporation

The system is used to order products and to see what Dell has in stock and the prices for these products by suppliers. A catalogue is offered in order to find the right spare-parts for the different machines. This goes together with the theory presented by Lancioni, Smith and Oliva.

The respondents argue that it is possible to track shipments and equipment, as the theory suggest, if it becomes necessary. Although he does not see any major advantages to do so since they get informed whether the goods ordered will be delayed or not in other ways. Regarding the ability to contact the vendor concerning customer service as suggested by Lancioni, Smith and Oliva, both the respondents are uncertain. Normally both the respondents are using the telephone when problems occur.

Dell has its own stock, so the respondents cannot say if they can reserve space in public warehouses as mentioned by Lancioni, Smith and Oliva. They argue that an Extranet can be used in SCM to schedule outbound shipments from private and public distribution centers on a 24 hours basis. Dell is not using this possibility and the 24 hours 7 days a week access to orders, to see if the product is manufactured and on its way and other status of orders placed with vendors. Lancioni, Smith and Oliva stated that an Extranet could be used to receive orders from international customers.

According to Lancioni, Smith and Oliva, an Extranet can be used in SCM to pay invoice electronically, check outstanding debit and to notify vendors of changes in configurations. An Extranet can be used to directly communicate with suppliers and customers. Dell also uses e-mail 24 hours per day to communicate with their suppliers and customers regarding supply issues. The customer service problems are not dealt with in any new way with the introduction of Extranet which contradicts Lancioni, Smith and Oliva. The respondents did not agree with Lancioni, Smith and Oliva

claiming that the extranet reduces service costs and responsiveness to customer service problems. The respondents agree with the literature regarding Extranet providing the ability to schedule pickups.

4.1.3 Cross-case Analysis

In the cross-case analysis, a comparison between cases is made regarding their use of Extranet in SCM (see figure 4.1). The table below lists each of the companies that took part in our sample and their stated use of Extranet in SCM. In the following tables a mark will mean that the organization agree with the statements to the left. Sometimes I have had to find out which thought was strongest at the companies. This especially when the respondents had slightly different views on an issue.

As exhibited in table 4.1 below, none of the companies agrees with that Extranet offers the ability to schedule outbound shipments on a 24-hours basis from distribution centers. Dell though says that by Extranet, users can check the products, if it is produced or on its way. Both of them claim that Extranet provides everyday world-wide customer-service. Cisco argues that they are able to provide the stated customer service in the aspect that the customer can place an order on a 24/7 basis however no other customer service is offered by ecosystem.

Cisco and Dell agree that Extranet can be used to directly communicate with vendors and customers on a $2^{4}/_{7}$ basis by e-mails. None of the companies acknowledge that Extranet make the responsiveness to customer service problems better. However none of the companies have noticed that the response time and service costs have reduced more than slightly with Extranet. All the companies agree that Extranet offers the ability to schedule pickups and deliveries.

Table 4.1. Use of Extranet in SCM.

| | | |
|---|---|---|
| Buyers can fund, select, order items without any human contact. | • | • |
| Able to track shipments and equipment | • | • |
| Able to contact supplier regarding customer service problems | | |
| Able to reserve space in public warehouse | | |
| Able to schedule outbound shipments from private and public distribution centers on a 24 hours basis. | | |
| Able to provide 7 days 24 hours worldwide customer service | • | • |
| Able to receive orders from international customers | • | • |
| Able to notify vendors of changes in products. | | |
| Able to pay invoices electronically an to check outstanding debit balances. | | • |
| Able to communicate directly with customers and supplier | • | • |
| Able to be more responsive to customer service | • | • |
| Able to reduce service costs and response time | • | |
| Able to schedule pickups and deliveries | • | • |

Overall, the respondents disagree to some extent about the functionality of Extranet or in other words the use of Extranet in SCM. One reason for the respondents to disagree is that the Extranet is rather new and the users have not fully changed their routines and explored on the possibilities of Extranet.

## 4.2 Advantages of Extranet in SCM

The advantages of Extranet use in SCM have been investigated by several researchers as presented in chapter2. The theory is compared with the data gathered in the within —case analysis. After the within-case analysis, a cross an analysis is conducted exploring on the differences between the cases made.

### 4.2.1 Within-case Analysis of Cisco

Ananarajan, Ananarajan and Wen state that one of the advantages of Extranet use in SCM is that it lessens the time and paper work associated with coordinating and dealing with suppliers, which will benefit in cost savings, Cisco argues that some time and paperwork associated with co-ordination will end up in cost savings, The paperwork will decrease since Cisco only control the orders, they do not receive faxes and printouts and moreover, they do not have to make any timesaving when looking at transport. Ananarajan, Ananarajan and Wen argue that a shared database between partners is a cost reducer since it reduces relevant costs of e.g. marketing research. Cisco has no opinion of this since they have no shared database with their customers.

Holme argues that Extranet reduces costs when unnecessary middlemen are eliminated. Cisco has no experience of eliminating middlemen due to the implementation although the manpower has been lessened regarding paper handling and time consumption. However, Cisco supports Holme regarding middlemen since both respondents think that the number of persons involved in a transaction can be decreased, thereby reducing the cost.

Altogether Cisco argues that Extranet in SCM reduces the cost in different tie spans. Matsen argues that cost savings are seen in the long run when the cost for placing order would end up in cheaper spare-parts. In addition Wijk argues that the possibility

for the customer to decrease the stock level lessen the costs for the customers from day one.

Regarding the ability for ecosystem to reduce the time between trading partners in the supply chain, both respondents say that this is not much. Timesaving, though can be made according to Cisco since paper handling is more time consuming than electronic transmissions and that is another advantage with ecosystem which corresponds to which argument by Pfaffenberg. The respondents do agree to some extent with the argument saying that the Extranet is speeding up coordination among trading partners in the supply chain. In essence timesaving is present according to the respondents following the theory presented in chapter 2

Cisco argues that the Extranet decreases the corporation in the supply chain since the personal contact decreases and it is easier to swap supplier, which goes against the theory by Graham and Hardaker. No collaboration in product development is made at present, which is suggested by Pfaffenberg to improve corporation. Since the respondent does not collaborate in product development they did not comment on the matter. According to Saunders and Spekeman, Kamauff and Myhr companies are more willing to share information with trading partners, which is agreed by Wijk and Matsen. This has been made by Cisco that has opened up their database so customers can see prices, disclaims, discounts etc.

Cisco follows the arguments of Ananraj an, Ananrajan and Wen stating that Extranet can be used to improve the feedback to customers, however not to a high degree. The lead-time is not affected significantly as suggested to be by Ananarajan, Ananrajan and Wen. The reason for this is that orders were made by faxes previously and at present they are made electronically. However there is always someone that has to accept the purchase. Wijk and Matsen agree that the customers get 24 hours-a-day

access as stated by Evans and King, however, the order still has to be forwarded by someone. To sum up the customer service is not affected to any major extent by Extranet according to Matsen and Wijk.

One good thing with Extranet is the argument of reliability and accuracy being improved by Extranet implementation. As argued by Pawar and Driva, the number of printouts, documents being lost and errors will get lower. This is an advantage with Extranet according to Matsen and Wijk.

4.2.2 Within-case Analysis of Dell

The major advantages with Dell's Extranet according to Lundberg and Hulin are that "the prices can be seen directly and that Dell can decrease its stock."

Ananarajan, Ananarajan and Wen claim that Extranet will lessen the time and paper work associated with coordinating and dealing with suppliers. Lungberg though argues that time is not decreased much in the process of placing orders and only a few minutes to hours can be saved. In accordance with the literature though, the respondents agree that cost will be reduced by Extranet seen in the long run. This is because paper work will decrease to some extent as argued by Ananarajan, Ananrajan and Wen especially in the future with the electronic spare-part catalogue. Holme suggests that middlemen will be eliminated and therefore the cost will be reduced with the Extranet. This statement is however not agreed upon by Dell.

The respondents do not believe that Extranet reduces time between trading partners as suggested by Pfaffenberger and Ananarajan, Ananrajan and Wen, other than what was explained in the previous paragraph. It is claimed that Extranet is speeding up coordination among trading partners involved in transactions, this is however not in line with what the respondents believe. Hulin and Lundberg believe that the corporation is not influenced by Extranet other than in the future which goes against what the literature

suggest. McIvor et al. suggests that companies are collaborating in new product development, integrating key business process and cross-functional information sharing. The respondent do not agree that this will be applicable to Extranet since all machines are owned by Dell and they can therefore not see any advantages in it. The participants of the Extranet do not use a common database and they do not think it would influence the corporation in the supply chain as argued by Ananarajan, Ananrajan and Wen. Saundersand Spekman, Kamauff and Myhr suggest that organizations are more willing to share information with trading partners, which is in line with what the respondents argue. They have noticed an increase in the information received from Dell, especially regarding prices and stocks.

Ananarajan, Ananarajan and Wen claim that Extranet in SCM can be used to improve feedback to customers. Hulin and Lungberg disagree with this arguing that Extranet has a possibility to affect the customer feedback especially in the future, though arguing that the customer service in total is improved by Extranet. The respondents do not agree with Ananaraj an, Ananarajan and Wen's statement of Extranet reducing lead times. However, following the argumentation of Evans and King that Extranet gives the customers around the clock service and the respondents further argued that Extranet increase the speed of communication with trading partners in the supply chain as stated by Pawar and Driva and Maloney.

In line with Pawar and Driva say that Extranet decreases the number of documents lost and errors to occurs such as wrong spare-parts being delivered.

4.2.3 Cross-case Analysis

In the cross-case analysis, a comparison between cases is made regarding their perceived view of Extranet advantages in SCM. Table 4.2 lists each of the companies

that took part in my sample and their perceived view of the advantages of Extranet use in SCM

Table 4.2. The advantages of Extranet use in SCM.

| | | |
|---|---|---|
| *Cost saving* | • | + |
| Less time and paper work associated with coordinating and dealing with suppliers | • | • |
| A shared database between partners is a cost reducer since it reduces relevant costs of market research. | | |
| Extranet reduces cost when unnecessary middlemen are eliminated. | • | • |
| *Time reduction* | • | • |
| Timesaving can be made since paper handling is more time consuming than electronic transmission. | • | • |
| The Extranet is speeding up coordination among trading partners directly involved in specific transactions | | |
| *Improved corporation* | | |
| Extranet will improve communication through a common database for tracking customers in the supply chain | • | • |
| Companies are, collaborating in new product development, inter\grating key business processes and cross-functional information sharing on a range of issues | • | |
| Cooperation and trust is in focus and the organizations are more willing to share information with trading partners | • | • |
| Extranets enable remote and internal users to interact in order to design, plan and market products or services. | | |
| *Improved customer service* | • | • |
| Extranet in SCM can be used to improve feedback to customers. | • | |
| Extranet provides access to information and decreased lead times. | • | • |
| Extranet gives the customers 24 hour-a-day access, updated information and more focused target marketing efforts. | • | • |
| *Faster communication* | | • |
| Extranet improves the communication within the supply chain. | | |
| *Reliability and Accuracy* | • | • |
| The chance of documents being lost and printing errors is getting lower with Extranet. | • | • |

As exhibited in table 4.2, Cisco and Dell perceive cost savings as an advantage for Extranet in SCM. Cisco argues that some time and paper work associated with co-ordination will end up in cost savings. The paper work will decrease since they only control the order and they are not obligated to handle faxes and printouts as well as they do not have to retype orders. Cisco, however, argues that no cost savings will be made. Dell claims that although cost savings are made, these are marginal. Therefore, it can be argued that Extranet can save money and time for an organization if the system us trusted and used thoroughly.

In general, none of the organizations thinks that Extranet will lead to improved corporation. One reason for this is the tight link between suppliers and customers in this industry in general, and that the corporation was high before the Extranet was introduced.

4.3 Disadvantages of Extranet in SCM

The theory will be compared with the data gathered in the within-case analysis. After the within-case analysis, a cross case analysis is conducted exploring the differences between the cases.

4.3.1 Within-case Analysis of Cisco

According to Spekman, Kamauff and Myhr, the face to face contact is getting less with the introduction of Extranet. This is something that is agreed upon by Wijk and Matsen. The respondents argue as well that the physical contact such as face to face is not affected substantially; however the telephone contact will decrease.

Regarding whether cultural disadvantages are seen, the two respondents disagree. Matsen says that the culture in the company has not been affected by the introduction of Extranet, Wijk however says that in the long run a new way of thinking is necessary and an understanding within the organization that the database should be opened up is

important. The arguments of Wijk correspond to the theory brought by Franklin which deals with those cultural problems that occur with the introduction of Extranet. Wijk might see the question in a more global way than Matsen.

Security is a barrier to widespread use of Extranet, hence not recognized by Cisco arguing that security is not a problem. The trust between the parties in the supply chain is considerably high according to the respondents. Trust has never, therefore, been an issue when implementing the Extranet. The respondents though agree with Wilson stating that trust is an important factor in Extranet use. The cost of implementing was another thing brought up as a disadvantage for Extranet. The cost for the Extranet system was not viewed as a disadvantage by Wijk. The respondents did not agree upon the cost of the implementation, probably since Matsen was not aware of this and saw it from his market company point of view.

4.3.2 Within-case Analysis of Dell

According to Spekeman, Kamauff and Myhr, the face to face contact is getting less with the introduction of Extranet. Hulin says that the face to face contact is almost the same, however, the number of contacts is decreasing and especially those by telephone due to the Extranet. This is according to Hulin a disadvantage. The respondents therefore, agree with the literature in the sense that the contact has diminished in favor of electronic means of communication.

Franklin states that cultural problems have been found to occur with the introduction of Extranet. Hulin does not agree with this saying that the Extranet has not affected the culture of the company at all.

Wilson argued that security is a barrier and that trust is an important factor in improving security. According to the respondents, security is not an issue since Dell still is conducting manual paper backup. Trust toward Dell is unchanged and very high. The

cost of implementing the Extranet is another disadvantage according to the literature. Dell had only the cost of a new telephone lines, and the respondents therefore argues that it is not a disadvantage.

4.3.3 Cross-case Analysis

In the cross-case analysis, I will compare the disadvantage of Extranet use in SCM between the cases. The table below lists each of the companies that took part in my investigation and their perceived view of the disadvantages of Extranet use in SCM/ (see Table 4.3).

Table 4.3. The disadvantages if Extranet use in SCM.

| | | |
|---|---|---|
| *Lack ofpersonal contact* | • | • |
| Face to face contact is getting less with the introduction of Extranet | • | • |
| *Cultural problems* | • | |
| Cultural problems have been found to occur with the introduction of Extranet | • | |
| *Security issues* | | |
| Security remains a barrier to widespread use of Extranet | | |
| Trust towards technology and trading partners is an important factor in improving the security | • | |
| *Cost of implementation* | | |

Both companies view lack of personal contact as one disadvantage of Extranet. Cisco argues that the physical contact such as face to face is not affected substantially, however, the telephone contacts decrease. Dell adds that the telephone contact and contacts in general in the supply chain have decreased with Extranet. The reason for this might be that Extranet could be viewed as a substitute or/and a complement to traditional communication tools.

Cisco believes partly that another disadvantage with extranet is cultural problems. Matsen claims that the culture in the company has not been affected whereas Wijk argues that the company has to change its thinking in the long run.

None of the companies view security as a disadvantage for Extranet. Dell argues that they are not looking at security as a barrier for they take manual paper backups. The company also mentions that they do not look at trust and agree that the trust towards technology and trading partners is an important factor, though pinpointing that there always has been a high level of trust among the supply chain actors. Thereby arguing for the lack of barriers in security to implement Extranet.

# V. FINDINGS AND CONCLUSIONS

In this, the last chapter of the project, the findings and conclusions drawn from the study is presented following the structure of research questions.

## 5.1 Extranet in SCM

Extranet is used to improve the process of trade and deliveries of spare parts. Overall, the companies investigated agree upon how it is used and what can be done. I think some disagreements stems from subjective views of, for example, what an improvement is.

One research question was how Extranet is used in supply chain management. In order to explore this question, theory was compared to reality. Our finding shows that overall, the suggested use of Extranet in SCM given by the theory is not fully correspondent to the reality of the Extranet investigated. The study shows proof of possibilities to add services to Extranet suggested by the literature.

Somewhat surprisingly, the respondents answer differently on three occasions regarding the functionalities of the Extranet. Since the functions are fixed in Extranet and all users should be able to use neither more nor less functions that the others, the answers should be equivalent. This is however not the case. Therefore, the research indicated that there is an unawareness of all the possibilities of Extranet use in SCM. The project also indicates that the view of the Extranet use in SCM might depend on the viewpoint. This indication is from the domestic parties, thereby observing possibilities with Extranet not seen by the others.

The research also shows some indications that trust in Extranets might affect the adoption of its use. One reason for this indication is that the company that differed concerning Extranet functions, claims that they are still using manual backups and

telephones, thereby indicating a lack of trust towards Extranet. Extranet has not only been used for less than one year by the users, and study therefore, indicated to some degree that the experience of the use of Extranet might affect the understanding of the functionality of Extranet.

In order to summarize the Extranet use in SCM, the thesis indicates that the studied Extranet is not fully developed, and more functions can be added. The project also indicates that the users are not aware of all the possibilities of Extranet use in SCM. The reasons for this might be according to the study findings-because of lack of overview, lack of experience using the Extranet and lack of trust in Extranet.

5.2 Advantages of Extranet in SCM

Another question from previous chapters was the advantages of Extranet use in SCM. A firm base of literature was developed and compared to the reality. The study shows that the companies interviewed agreed about some of the advantages suggested by the literature. The research shows proof that Extranet use in SCM is advantageous in the sense of time saving, reliability and accuracy.

The finding regarding the advantages of Extranet use in SCM was as follows:

(1) Extranet use in SCM might decrease cost.

(2) Trust might to some degree be considered important in Extranet use in SCM.

(3) Extranet might not improve the corporation in the supply chain.

(4) Extranet might improve the customer service in Extranet.

(5) Extranet might improve communication.

(6) Extranet might save money and time for an organization if it is trusted and used thoroughly.

The research indicated that the provider of the Extranet seems to see more advantages with its use than the other parties. The research also indicates that there can be a correlation between Extranet use and perceiving its advantages.

Also within advantages, disagreements occur among the respondents; especially the degree of corporation differs from what the literature discusses.

**5.3 Disadvantages of Extranet use in SCM**

Another question asked previously was concerning the disadvantages of Extranet use in SCM. In general the findings did not support the literature. The research however indicates that lack of personal contact might be a disadvantage with Extranet use in SCM. Some other findings regarding disadvantages with Extranet use in SCM were as follows:

(1) Security might not be a disadvantage with Extranet use in SCM.

(2) The cost of implementing an Extranet might not be a disadvantage of its use in SCM.

(3) Extranet might not create cultural problems in SCM.

The research indicates that the provider of the Extranet might see more disadvantages with its use then the other parties. The research also indicate that there might be a correlation between Extranet use and how perceiving its disadvantages.

**5.4 Conclusion**

**The** conclusion drawn from the project is that the provider of the Extranet seems to view the Extranet in different ways than the users both in terms of its usage and also its disadvantages and advantages. The study further indicates that the knowledge of Extranet use might depend on experience of using it, trust towards Extranet and what overview the users have of the Extranet. There is a correlation between the usage of the Extranet and how the advantages and disadvantages are perceived.

The Extranet investigated differs from what the literature suggests on many points. One reason for this might be the low maturity of the Extranet studied. Another reason can be the tight relationship that seems to exist among the companies investigated. The well-established co-operation that already existed before the Extranet was introduced, may be another reason for the differences compared to the literature.

5.4.1 Summary of Cisco's Extranet

Cisco's approach to building an extranet is an outstanding example of an organization prepared to think outside its existing boundaries. The company has in fact opened up its internal information systems to suppliers and other supply chain partners, giving their employees the same access rights to information as Cisco employees, and thus enabling the Cisco ecosystem to act as a distributed knowledge management network. This level of network intelligence has allowed Cisco to generate considerable strategic leverage from its supply chain.

To summarize, Cisco's Extranet, or they call the ecosystem, has involved several initiatives. These include:

(1) A single enterprise system: embracing contract manufacturers, distributors, logistics partners, sales representatives, service engineers, development engineers and customers into a single information system. This enables business partners to manage much of Cisco's supply chain.

(2) Information sharing in real time: the entire supply chain operates from the same demand signal. This means that any change in one node of the network is immediately transmitted throughout the network.

(3) Direct fulfillment: whereby most of Cisco's contract manufacturing partners' ship directly to customers. Today, suppliers directly fulfill 55 percent of the company's customer orders.

(4) Automatic testing: to ensure product quality by creating test cells on supplier production lines. The cells are able to automatically configure test procedures when an order arrives.

(5) Rapid new product introduction: reducing the number of iterations required during prototype development. Automation and better connectivity have also reduced time-to-market by three months.

Taken together, these initiatives have had an immense impact on value creation. Cisco estimates that in financial year 2000, its interconnected supply chain generated a total of US$695 million in cost savings (see Table 5.1)

Table 5.1. Cisco's Supply Chain Financial Benefits-2000 Financial Year. (Source; Various Cicso Systems SEC Filings)

| | |
|---|---|
| Direct fulfillment: partner builds and ships direct to customer | 15,000,000 |
| Auto test: integrated testing process controls assemble testing throughout supply chain | 108,000,000 |
| Single enterprise: transformation of supply base to operate as one entity | 170,000,000 |
| Product life cycle: | |
| Productivity improvements | 14,000,000 |
| Income: faster time-to-market | 388,000,000 |
| Total | 695,000,000 |

Cisco's Extranet has also provided a scalability and agility that allows the company to grow with incredible speed. In the intensely competitive market spaces

occupied by Cisco — where the timelines for new product introduction are counted in weeks than months or years — the company's ecosystem has become as great a core strategic capability as its strengths in product design and marketing.

5.4.2 Summarizing Dell's Extranet

Dell started out as a specialist company in the PC industry's horizontally-segmented industry structure. It assembled its own computers from standard parts and components mapufactured by others and delivered its products directly to customers. Dell focused on the relationship with the customer, but in order to sustain a high growth rate while providing necessary customer service, Dell built a complex web of relationships rather than doing everything itself. With its build-to-order model, Dell viewed final assembly as a core competency which was kept in-house, but it outsourced components, pre-assembly and logistics. Service and support were also viewed as a key part of relationship selling, so Dell kept control of the function but outsourced some service delivery functions to business partners (resellers, system integrators, service companies) who would help customers to install, support, and service Dell PCs. Thus, Dell became a virtual corporation as a matter of business strategy. The key to the strategy was fully exploiting information technology, the Internet, and e-commerce.

In a 1998 interview, Michael Dell explained how he was using information technology to blur traditional boundaries in the value chain among suppliers, the manufacturer, service and support partners and end users to evolve in a direction that he called the virtual corporation. Dell's innovation was not the individual pieces of the strategy— customer focus, supplier partnerships, mass customization, or just-in-time— although these were certainly important. The real innovation was how to combine them using information and IT to coordinate across company boundaries to achieve new levels of efficiency and effectiveness for the entire value system. The fundamental

insight was that IT could allow Dell to achieve coordination of the system and keep its control over the customer relationship.

To do so, Dell focused on using IT and the Internet to improve internal processes such as ordering, assembly, delivery and support, to coordinate its broader value web, and to enhance the customer relationship. A key idea governing process improvements is that information should be diffused as widely as possible throughout the value web to enhance the performance of the entire network and provide rapid feedback to the center. This means that Dell can analyze trends, problems, solutions, performance, and customer satisfaction in real time, creating positive feedback flows that keep the whole system functioning well. Several examples illustrate the powerful role of information and IT in coordination.

(1) To help its sales organization, Dell has codified information about its product offerings to simplify ordering by phone or the Internet. Dell logs all interactions with its customers so it can determine purchasing behavior, demand patterns and satisfaction levels. This direct contact with the end customers gives Dell insights into how customers buy computers, and what motivates people in different markets. It also enables Dell to use its customer records to anticipate demand. By learning about replacement cycles in different markets, Dell has been able to forecast demand carefully and to target customers with its direct sales force.

(2) To help its production organization, Dell passes information from sales directly into logistics and assembly, letting its suppliers and the factory floor know the real time demand for PCs and components. By logging all of its customer service interactions, Dell also gets real time information about the performance of its products, enabling it to respond to problems faster and

avoid costly refunds and service calls. A good example was provided by Dell's ability to respond rapidly when Intel shipped faulty Pentium chips to computer makers in the mid-nineties. Dell knew exactly where the problem chips were and could easily help customers to replace them. Competitor firms did not know. They had to stop production and go to channel partners to find the problem chips thereby incurring considerable time and cost. The delay, plus the fact that Dell could shift to faultless chips immediately because it had no inventory, caused new customers to look to Dell rather than its competitors.

(3) To help its support organization, Dell mapped out how the support staff could use information within the firm to answer customer questions and provided that knowledge online. It has also provided support staff with online access to each customer's original system configuration and service history. It connected the technical specialists staffing the support lines with Dell marketing, manufacturing and product design groups, exposing many employees in diverse positions to support issues. And, it has provided its service partners with access to the same technical and customer information available to its own support staff. As a result, support staff throughout the value web can perform their function easier, faster and better. Because information is shared no matter where it is collected, the center has the same information available as the periphery.

Dell's value web, or virtual company, organization is built on two premises. First, Dell always controls the relationship with the end customer. Dell initiates sales calls through its field forces and outbound call centers. Inquiries and orders come to Dell's web site and inbound call centers and Dell coordinates fulfillment, final assembly, and

distribution. Help, service and support calls come to Dell's web site or call centers which handle them directly or route them to service partners to handle.

Second, Dell relies on its partners to physically provide many of the capabilities needed to build, distribute, and support its PCs, and especially to offer a broad range of e-commerce solutions. In each case, the role of IT, the Internet, extranets, and e-commerce has been vital to executing the virtual company vision. The direct relationship with the end user does still rely heavily on human interaction, especially between Dell's field sales forces and its corporate customers. However, Dell uses online tools to support its own people and to provide an array of services to the customer. These services tighten the relationship by electronically linking Dell's and its customers' businesses processes and provide benefits that the customer would forego if it were to switch to another PC supplier.

Coordination of the value web is accomplished electronically through legacy systems, the Internet, extranets, e-mail, EDI and newer applications such as i2 and Ariba. These technologies not only reduce costs and improve quality, they make it possible to coordinate a much broader value web and transact larger volumes of business than could possibly be done in their absence. Taken together, the foregoing uses of IT enable the value web to be coordinated in real time and in a relatively seamless fashion, allowing Dell to continually refine the direct model to achieve greater customization, faster response times, higher quality and lower cost for customers.

Dell is now using the Internet and e-commerce to create closer relationships with customers that it has previously considered transactional— individual consumers, the home and the small business market. If Dell succeeds, it will have found a low cost, effective way to extend its reach to new customers in undeveloped and emerging markets that have been too expensive to cultivate in the past. This would include

markets outside the U.S. where Dell is just beginning to concentrate. If Dell is unable to develop such new markets profitably, its growth rate will continue to decline. Thus, Dell's ability to extend its successful IT and Internet-enabled business model beyond its core market of large U.S. organizations is a key to its future growth.

An overall conclusion is therefore, that the more mature the Extranet becomes the more experienced the user will be and the more trust he / she will have in the system. This will in its turn make the user be more aware of disadvantages and advantages of the Extranet.

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