HOW IT-ENABLED SCM AND E-COMMERCE HELP DELL IMPROVE COMPETITIVE ADVANTAGE

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Abstrak *: Information technology, dan teknologi Internet pada khusus merupakan fasilitator (enabler) yang memungkinkan information sharing antar perusahaan tanpa kendala dan real-time baik internal maupun antar-organisasi. Dampak IT dan teknologi Internet bersama dengan tiga tipe networks pentingnya seperti Intranet, Extranet, dan Web pada manajemen rantai pasokan atau supply chain management (SCM) dan commerce menjadi IT-enabled SCM dan e-commerce, sehingga transfer data digital dan koordinasi serta information sharing dapat dijalankan dengan lancar, murah dan real-time.Persaingan bisnis yang ketat dewasa ini mengharuskan perusahaan menerapkan IT-enabled SCM yang efisien dan e-commerce yang efektif, sehingga persaingan tidak lagi terletak pada persaingan antar perusahaan, melainkan terletak pada persaingan antara rantai pasokan. Tujuan paper ini, pertama: menganalisis dan membahas trend dalam SCM dan e-commerce dengan cara meneliti bagaimana IT dan Internet pada khususnya seperti intranet, extranet, and Web mentransformasi dan merampingkan SCM dan e-commerce. Kemudian: studi kasus pada Dell, Inc.untuk mengetahui bagaimana Dell, Inc. sukses menjalankan IT-enables SCM dan e-commerce.*

Kata kunci:information sharing, IT, ICT, Internet, Intranet, Extranet, Web, SCM, e-Commerce

1. INTRODUCTION

In the emerging global economy, Information technology (IT) has increasingly becomea necessary component of business strategy and a strong catalyst for economicdevelopment. The strategic integration of information and communications technology(ICT) in business has revolutionized relationships within organizations and those betweenand among organizations and individuals. Firms are effectively using new IT and wireless telecommunications to improve service and delivery processes. Through secure intranet systems and business-to-business (B2B) e-commerce platforms, the focus is on improving information management: integrating internal systems with external partners—like Dell's practice of giving customers the ability to match supply and demand because its customers order computer configurations over the phone or online through Web site or Internet. More than ever possible before, the Internet increases the quantity and expands the richness of information in real-time to a much wider set of participants and thereby raises dramatically the value of information in supply chain management.New information technologies and e-commerce solutions have transformed supply chain operations from mass production to mass customization as conducted by Dell, Inc.Using the Internet, Intranet, Extranet, Web and associated information technologies, bits of information—strings of zeroes and ones—can be shipped anywhere in the world in seconds at virtually no cost, opening up a world of opportunity and rapid innovation. Moreover, with digital products there are no time-to-manufacture delays, no inventory shortages, and no delivery problems.Of particular interest here is the impact of new information technologies on supply chain operations now and into the future.

Electronic data interchange (EDI) has been heavily used in industries. The Internet and the Web are widely accepted since they broaden the scope of connectivity among individuals and businesses. Web technologies allow firms to collaborate with business partners to gain the benefits of reducing costs, enhancing customer satisfaction, and retaining competitive advantages.Dell, Inc. is known throughout the world asa leader in SCMand just-in-time (JIT) manufacturing.Relying heavily on a vendor managedinventory (VMI) model, Dell hasnearly eliminated inventory cost whilemaintaining a JIT manufacturingstrategy. The power of SCM and e-commerce are well exemplified by Dell, Inc.Dell's two-level marketing channel or direct-sales model is well known to the business community.By adopting two-level of marketing channel and distribution, Dell has eliminated the middleman within their supply chain and has also exemplified an innovative business model through its effective supply chain management. Dell Computers continues to enhance and broaden its competitive advantage by integrating the Internet into its entire business process, including online marketing &sales, procurement, customer support and CRM.

This paper first discussesIT, the Internet in particularaffects Dell's SCM and e-Commerce, and how the IT-enabled SCM transforms and streamlines supply chain management and e-commerce. Then the impacts of the Internet and Web technology on supply chain management and e-commerce are discussed. Next, Dell's successful supply chain management and e-commerce implementation are illustrated and discussed.

2. THEORETICAL BACKGROUND

2. 1. Information Technology, the Internet Technology: Intranet, Extranet, and Web

According to Turban et al. (2010), IT is the collection of the computing systems in an organization, or organization's collection of information systems, their users, and the management that oversees them. IT in its narrow definitionrefers to the technological side or the technology component of an information system. It includes the hardware, software, data and database, networks, procedure, people, and other electronic devices. In practice,ICT refers to the technology component of information system (IS) which emphasis on the "communication multimedia or equipment."As an enabling technology, ICT, the internet technology in particular, has become the major facilitator of a firm's business activities both in global and domestic economy in which every firm has to win over its competitors.

Basically, the Internet consists of computers with data, users who send and receive the data files, and a technology infrastructure to move, crate, and view or listen to the content. An intranet is a network that funs internally in a corporation using Internet standards. An extranet is an intranet to which value chain partners are admitted for strategic reasons (Chaffey et al., 2006). The roles and positions of Internet, intranet, and extranet in a firm's activities are clearly delineated in Figure 1.One of the first applications of e-commerce that sell consumer goods and industrial products is to develop an electronic catalog on their Web sites.

Table 1: Comparison of the Internet, Intranet, and Extranet

Descriptions	The Internet	Intranet	Extranet
Access	Public	Private	Private
Information	Fragmented	Proprietary	Shared by closed business partners
Users	Everybody	Members of an organization	Groups of closely related companies

Table 1 clearly delineates the comparison among the Internet, intranet, and extranet. The general applications of extranet by major factors are shown in Table 2, and the Internet versus intranet is shown in Table 3.It is also responsible for the integration between firms which brings about smooth flow of information and products between customers, suppliers and the transportation through 3PL (third party logistics). The relationship that exists between IT and the supply chain is one in which IT improves the supply chain through integration. The most direct effect of the Internet is to create new opportunities to improve the efficiency and effectiveness of the operation of the supply chain and exchange processes through e-commerce.

Table 2: General Applications of Extranet by Major Sectors

Sector	Application
Government	Electronic filing of SEC documents and fax documents
Manufacturing	Order status, and online order placement by customers
Pharmaceutical	Gathering test data from different sources for drug testing conducted by researchers throughout the world
Service Industry	Providing access to corporate databases, account information and for transfer of funds to their customers
Transportation	Allowing customers to check into the availability schedules for their truck, rail and air fleets
Utilities	Allowing customers to access account and utilization status

2. 2. How Does Internet Affect Supply Chain Management?

The relationship between information technology and the supply chain can be explained as: IT is responsibleforintegrating the supply to achieve greater capabilities and profits. The primary role when it comes to supply chain management is creating the integration of processes and information within a firm such as marketing, finance, sales, manufacturing and distribution.

Table 3: The Internet versus Intranet

Key Feature	Internet	Intranet
User	Anybody	Employees Only
Geographical Scope	Unlimited	Limited to unlimited
Speed	Lower than intranet	Higher than Internet
Security	Lower than intranet	Higher than internet
Technology Used	TCP/IP	TCP/IP
Document Format	HTML/XML	HTML/XML
Multimedia capability	Could be lower than intranet	Could be higher than internet

Impacts of the Internet in SCM:The Internet changes the way companies do business. The changes are permanent in the transition from the industrial economy to the network economy. SCM has been enabled by convergence, which refers to the integration of computer and communication technology (Short, 2002). The Internet-strengthened power of convergence can be depicted in two aspects --*Ubiquitous and low-cost connectivity makes it possible for small and mid-sized companies to take advantage of SCM techniques*. And -- *Speedy network transmission helps businesses realize seamless and real-time communications and transactions.*The potential challenges and impacts made by the Internet can be categorized as follows:

a. *Shifting power to buyers:* Many e-commerce experts have profound arguments on the impact of the Internet on the supply chain is that the Internet is shifting power from the seller to the buyer irreversibly. The search power for the buyer is now unbounded. Suppliers also provide products and services information through their Web sites.
b. *Enabling global interconnectivity:* The Internet not only provides businesses and individuals with the convenience and flexibility in transaction and communication, but also brings the competitions into the global arena.

c. *Enabling the trading partners to better coordinate and collaborate:* The Internet enables the trading partners within the SC to better coordinate and collaborate for mutual benefits.
d. *Breaking the old paradigms of inter-organizational boundaries:* The Internet changes the way supply chains are managed, planned and controlled. SCM-related information and decisions are integrated into the Web, breaking the old paradigms of inter-organizational boundaries.

The Internet and Web technology's contribution to SCM and e-Commerce: The Internet and Web technologies can support the entire supply chain's operations. Internet-based supply chain operations are fast and inexpensive. Customers can instantly check the status of their orders by simply clicking their computer mouse. The Internet and Web technology made the following contributions to SCM:

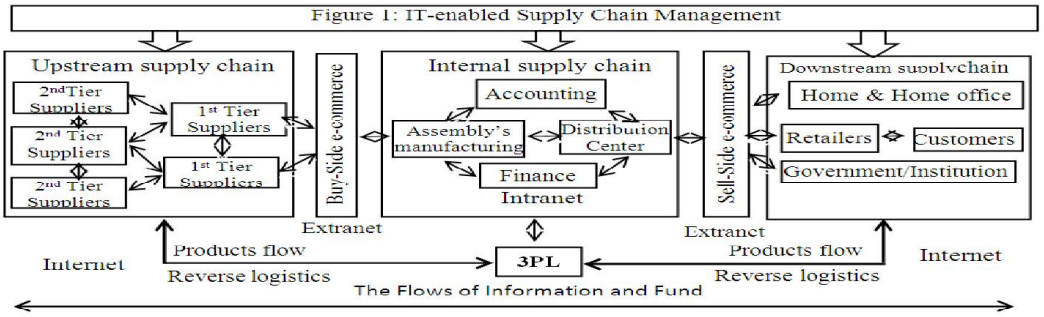
a. *Developing e-commerce applications:* E-commerce consists of *buy-side e-commerce* and *sell-side e-commerce*as shown in Figure 1. Sell-side e-commerce plays an important role in SCM because it supplies the critical data of customers and sales information to the whole partners that engaged in SCM. Customers' data could be from individuals or organizations – such as B2C, B2B, B2G e-commerce that are needed by all supply chain partners in terms of meeting customer satisfaction. SCM serves as the *back-end application*while e-commerce serves as the *front-end application* by linking a firm with its customers.
b. *XML-based information exchange and sharing:* EDI plays an important role in the evolution of SCM. Trading partners used EDI for information exchange, such as sending requisitions and receiving purchasing orders.The XML(Extensible Markup Language) based Internet system allows organizations to exchange data on a transaction-by-transaction basis. As XML documents and XML schema are text-based, they can be transmitted through HTTP protocol.
c. *Applications integration:* Applications integration is one of the most important IT strategies since it can create or modify the interactions among related applications and to encompass canned software, legacy applications and Web services.
d.*Comprehensive integration of various technologies:* IT in various forms and combinations ranging from Internet, Web-based Technology, HTML and XML to different applications and systems including ERP, CRM, SCM, and enterprise application integration (EAI), are enabling business processes and creating new business contexts for companies to operate effectively and efficiently in real-time.
e. *Partners' collaboration:*Collaboration among trading partners helps SCM participants gain great benefits from providing end customers with high quality, low cost products through flexible and efficient distribution.

2. 3. The Concepts and Definitions of Supply Chain Management

SCM is the concept getting the right things to the right places at the right times for profit. It is the science of better, faster, and cheaper. SC is made up of many interrelated firms. There are parts suppliers, component suppliers and subassembly suppliers. Further up the chain are the suppliers' suppliers, finally reaching the raw materials suppliers at the far end of the chain.

While supply chain management is as old as trade itself, new information and communications technologies have revolutionized today's supply chains, making them extraordinarily better, faster, and cheaper.Dell's suppliers play a key real-time role in keeping production,distribution, and information flowing smoothly.A supply chainis a

concept describing the flow of *materials, information, money*, and*services* from raw material suppliers through factories and warehouses to the end customers. A supply chain also includes the *organizations* and *processes* that create and deliver these products, information, and services to the end customers (Turban et al, 2010).Supply chain can be broken into three major parts as *the upstream supply chain*whichincludes the activities of a company with its first-tier suppliers, *the internal supply chain*whichtransforming the inputs received from the suppliers into the organization's outputs. It is mainly concerned with manufacturing, assembly's manufacturing, distribution, marketing, and inventory control, and *the downstream supply chain*whichis directed at distribution, warehousing, transportation, and after-sale services. The activities that add value to the company's goods or services are part of what is called the value chain.



According to Hutt et al. (2010), the SCM concept is an integrating philosophy for coordinating the total flow of a supply channel from supplier to ultimate user. Initially, the concept of a *supply chain* refers to the flow of materials from their suppliers to the company, and then inside the company to places where they are needed. The function of SCM is to plan, organize, and coordinate the activities along the supply chain. Today, the concept of SCM refers to a total systems approach to managing the entire supply chain. When a supply chain is managed electronically, usually with Web-based software, it is referred to as an e-supply chain.It should be noted that as the Internet becomes more pervasive and ubiquitous, the distinction between **IT-enabled supply chains** and **e-supply chains**is rapidly diminishing. Most supply chains now involve a mix of Web-based, Internet, Extranet, Intranet, and other information systems to ensure efficiency and uninterrupted flows of goods and services in a timely manner. The improvements in supply chains frequently involve an attempt to convert them to e-supply chains, namely, to automate the information and financial flows in the chain.Information sharing can increase supply chain efficiency by reducing inventories and smoothing production. *IT-enabled Supply chain efficiency is highly important as today's competition is no longer between companies, but between supply chains.*

The firm applies effective SCM processes that include (1) integrated computer systems that provide production schedules and demand forecasts to all supply chain members, and (2) collaborative programs-management tools that allow manufacturers and suppliers to synchronize activities and respond to events in real time. The supply chain includes a variety of firms, ranging from those that process raw materialsto make component parts to those engaged in distribution center and wholesaling. Included also are alltypes of organizations engaged in transportation such as FedEx and UPS, warehousing, information processing,and materials handling.Successful SCM coordinates and integrates all ofthese activities into aseamless level of performance.

The key elements of SCM and highlights the important integration that must take placeamong a variety of business functions and across several different organizations in thesupply chain.Integrated SCM focuseson managing relationships, information, and material flow across organizationalborders to cut costs and enhance flow.Leading supply chain–oriented firms focus intensely on monitoringactual user demand, instead of forcing into markets product that may or maynot sell quickly. In so doing, they minimize the flow of raw materials, finished product,and packaging materials, thereby reducing inventory costs across the entiresupply chain. Partnerships arethe Critical Ingredient, in recent times, many companies have redesigned their supply chains to outsource some part of their supply chain activities, often with the help of sophisticated, Web-based EC and IT support packages. To integrate activities across the supply chain, close working relationships arerequired. SCM may require that all firms in the supply chain share sensitive and proprietaryinformation about customers, actual demand, point-of-sale transactions, andcorporate strategic plans.

SCM is both a boundary-spanning and function-spanning endeavor. The underlyingpremise of SCM is that waste reduction and enhanced supply chain performance comeonly when there are both intra-firm and inter-firm functional integration, sharing, andcooperation. Thus, each firm within the supply chain must tear down the functionalsilos within its organization and foster true coordination and integration of marketing,production, procurement, sales, and logistics. SCM can be a powerful competitive advantage weapon, as market leaders like Dell hasdemonstratedthrough the unparalleled success oftheir supply chain processes. Dell achieves competitive advantage through deploying successful IT-enabled SCM. Dell achieves rapid response by building personal computers with each customer's requested software in a manner of hours. Dell's dominant strategy is quick, reliable *response*. Competitive advantage consists of at least the aspect: *differentiation* or *better than competitors*, *low-cost leadership,* and *response.*SCM is the science of better, faster, and cheaper in terms of getting the right things to the right places at the right time, for profit. These goals can be achieved successfully by demonstrating comprehensive and effective IT-enabled SCM.

Information and Technology Drivers orSCM Software:Supply chains could not function at high levels of efficiency and effectiveness without powerful information systems. The Internet – and Internet technology in particular is the major tool firms rely on to manage their lengthy and integrated systems. SCM software refers to software that supports *specific segments* of the supply chain, especially in manufacturing, inventory control, scheduling,warehousing, and transportation. This software is designed to improve decisionmaking regarding supply chain issues, optimization, and analysis. SCMsoftware applications provide real-time analytical systems that manage the flow of products and information through the supply chain networks. The result is that firms can work with a comprehensive "supply chain suit" of software that manages flow across the supply chain while including all of the key function areas. Several firms producing "Enterprise Resource Planning (ERP)" software such as SAP and Oracle have developed applications that attempt to integrate functional areas and bridge gaps across the supply chain. SCM software creates the ability to transmit data in real-time and helps firms transform supply chain processes into competitive advantages. 3PLs such as FedEx and UPS, as Dell's partners are the best-practices leaders at seamlessly integrating a variety of technology to enhance all processes across an extended supply chain.

3. CASE STUDY: Dell, Inc.(Source: (*www.dell.com*and *www.dell.com/delldirect)*

Dell Computer Corp., known as Dell, Inc. was founded by Michael Dell in 1984. By 1993, Dell, Inc. had become one of the top five computer makers worldwide, threatening Compaq, which started a price war. At that time, Dell Inc. was taking orders by fax and snail mail and losing money. Losses reached over $ 100 million by 1994. The company was in trouble.

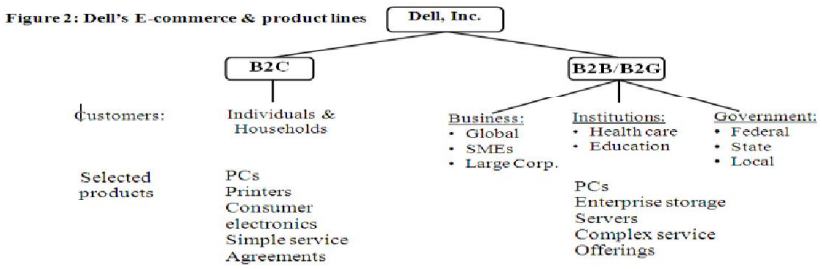
Although Dell, Inc. was the largest PC vendor in the world, but its chief advantages – direct marketing and power over suppliers – were losing their punch. The percentage of 2005 PC sales via the phone and Internet fell in the U.S. as the sales through U.S. retail stores rose – a channel in which Dell was absent. By 2006, the once torrid growth in PC sales had slowed to about 5 percent a year.The research questions are: 1). How does Dell, Inc. survive from its losses? ; 2). How should Dell, Inc. adjust to its changing environment?

4. DISCUSSION AND RESULT (The analysis and solution)

The commercialization of the Internet in the early 1990s andthe introduction of the World WideWeb in 1993 providedDell with an opportunity to expand rapidly. Dell implementedaggressive online order-taking and opened subsidiaries inEurope and Asia. Dell also started to offer additional productson its Web site. This enabled Dell to batter Compaq,and in 2000 Dell became number one in worldwide PC shipments.At that time, Internet sales topped $50 million perday (about $18 billion per year). Dell sells about $62 billion a year in computer-related productsonline, from network switches to printers, employing over88,000 people.

4.1. B2C E-Commerce:

B2C E-Commerce: Sales to the first group are classified as B2C e-commerce. Consumers shopat *dell.com* using an electronic catalog. The sales arecompleted using mechanisms of e-commerce platform.B2C sales are facilitated by standard shoppingaids. Dell matches supply and demand because its customers order computer configurations over online. These computer configurations are built up from components that are available. Dell's strategy is to provide customized, low cost, and quality computers that are delivered on time. Dell successfully implemented this strategy through its efficient manufacturing operations, better SCM and direct sales model. Dell's product lines and its markets as shown in Figure 2:



4.2. B2B E-Commerce:

Sales to the other four groups areclassified as B2B e-commerce. Most of Dell's sales are to businesses that cover SMEs, Large enterprise Institution/educational, Government, and health-care organizations.B2B customers obtain additional helpfrom

Dell where Dell provides each of its nearly 100,000 businesscustomers with Premier Dell service as shown in Figure 2.

British Airways as an example considers Dell to bea strategic supplier. Dell provides notebooks and desktopsto 25,000 British Airways users. Dell offers two e-procurement servicesto British Airways purchasing agents. The more basic service, Premier Dell,allows British Airways and other businesses to browse, buy, andtrack orders on a Dell Web site customized for the user'srequirements. The site enables authorized users to selectpreconfigured PCs for their business unit or department.A more advanced version, Premier B2B, supports e-procurementsystems. This provides automaticrequisition and order fulfillment once an authorized user haschosen to buy a PC from Dell. British Airways has placed the e-procurementtools on its E-Working intranet.

4.3. Dell's IT-enabled SCM

*Dell demonstrates effective IT-enabled SCM in conducting business.*Delladjusts to its changing environment by deploying a comprehensive integration of IT-enabled SCM and e-Commerce.IT-enabled SCM enablesto communicate and collaborate with its many business partners withwhom it needs. Dell uses shippers, such as UPS and FedEx, to deliver itscomputers to individuals. It also uses third-party logisticscompanies to collect, maintain, and deliver components fromits suppliers, and it has many other partners. Dell is usingWeb Services, an e-commerce technology, to facilitate communicationand reduce inventories. Web Services facilitate B2B integration.Integration efforts began in 2000 with other technologieswhen Dell encouraged its customers to buy online.The B2B integration offercombines Dell PowerEdge serversbased on Intel architecture and WebMethods B2B integrationsoftware to link customers' existing ERP (enterprise resourceplanning) or procurement systems directly with Delland other trading partners.

*Dell demonstrates e-CRM effectively.*Dell uses a number of different toolsto provide superb customer service around the clock. Toleverage customer relationship management (CRM)—acustomer service or e-customer service approach that is customer centered forlasting relationships—Dell provides a virtual help desk forself-diagnosis and service as well as direct access to technicalsupport data. In addition, a phone-based help desk isopen 12 hours a day and seven days a week (24/7). Customers can also arrange for a live chat witha customer care agent.

*Dell demonstrates successfulIntra-business e-commerce.*IT-enabled SCM fully supports Dell for *mass-customization*. To support its build-to-order capabilities,significantly improve its demand-planning and factoryexecution accuracy, reduce order-to-delivery time, andenhance customer service, Dell partnered with Accentureto create a new, high-performance supply chain planningsolution.

Dell adopts effective e-marketing strategy. Dell's promotional programs links to a variety of Websites by which Dell provides affiliate partners theopportunity to link from their Websites to *dell.com*. Dellpays 2 to 4 percent on any qualified sale made from clickingon Dell's link at the partners' Websites.In addition, Dell auctions refurbished Dell computersand other products at*dellauction.com*. Online auctions are an important saleschannel. IT-enabled SCM also helps Dell manage its reverse products or reverse logistics as delineated in Figure 1.

4. 4. The Result

Dell succeeded in achieving competitive advantages through the deployment of IT-enabled SCM and effective e-commerce by which attributed to its direct-sales model

in mass customization; build-to-order and sell direct to customers. This made Dell excel over its competitors through effective IT-enabled SCM and e-commerce, andsurvived from losses of over US$100 million in 1994.Despite the slow PCs market forced Dell's revenue to drop, its core competency in strong IT-enabled SCM and e-commerce helped Dell manage 15 percent increase in product shipments as industry volume dropped 5 percent in 2001. As a result, Dell surpassed Compaq to become the No. 1 PC maker in the world in 2001.

Since the percentage of 2005 PC sales via the phone and Internet fell in the U.S. as the sales through U.S. retail stores rose - a channel in which Dell was absent. Dell responded this changing business conditions by restructuring its operations where all sales to businessesare now managed centrally, rather than from three regionalheadquarters around the globe. At the same year, Dell opened physical stores to match its competitorsand customer demands. Dell's major competitor, HP,regained its "top PC maker" position in 2006, leaving Dell insecond place, and stayed in the lead through 2008.

5. CONCLUSION AND MANAGERIAL IMPLICATIONS

5. 1. Conclusion

Dell matches supply and demand because its customers order computer configurations over the phone or online. This allowsDell to know what he must be able to supply in real time and then very quickly and precisely meet that demand while maintaining low inventory.These computer configurations are built up from components that are available. Dell's strategy is to provide customized, low cost, faster, and quality computers that are delivered on time. Dell successfully implemented this strategy through its efficient manufacturing operations, better supply chain management and direct sales model.Dell also saves time on processing orders that other companies normally incur in their sales and distribution system. In addition, by directlydealing with the customer Dell gets a clearer indication of market trends. This helps Dell to plan for future besides better managing its supply chain.Dell has succeeded in exploiting the advantage of the Internet to improve performance, and establish a unique e-commerce model by embracing the Internet in its supply chain. Dell brings products to market faster than its competitors:Dell uses direct sales via Internet, whereas traditional PC manufacturers previously assemble PCs ready for purchase at retail stores.

As shown in Figure 2, how Dell attracts large business customers is o facilitate B2B sales, the Dell site offers each customer an individualized interface called "Premier page"where purchasing managers log on and order using an interface customized for their company's needs while Dell's consumer sales are highly visible, its business sales are much bigger revenue.Dell computers are a good example of a successful SCM system which has led to a successful business. Dell incorporates a highly efficient built-to-order business model or mass customization which enables it to deliver customized products to its users. Buyers can click through Dell and assemble a conputer system piece by piece based on thier budgets and needs.

Entering this 21st century, Dell listens to customers and delivers innovativetechnology andservices they trust and value. Uniquely enabled by its direct business model, Dellsells moresystems globally than any computer company, placing it No. 34 on the Fortune 500.

5. 2. Managerial Implications

IT, The Internet in particular is just one component of Dell overall strategy: It simply extends the firm's reach, and it must be integrated into the overarching strategy

the firm uses to reach and interact with its customers. Even at Dell, where the firm operates at the phase-four level of e-commerce - full transaction capability – the Internet is just one approach to the marketplace. The Chairman Michael Dell says, "We work with customers face-to-face, on the telephone, or over the Internet. Although Dell, Inc. has successfully integrated new IT and human knowledge for success, but due to super competitive markets, Dell should need to continuously design and develop new and innovative products, product development and enlargement, and technology innovation to meet customer satisfaction.

The challenge for Dell, Inc. is that Dell's commitment to "The Green Supply Chain Management."We believe in the future, most countries or people prefer friendly environmental products and technologies. Many experts predict that we will see a major expansion in "green" supply chain initiative whereby companies are committing to design, source, manufacture, and manage the end-of-life stage for all of their products in an environmentally and socially responsible manner.

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