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DELL COMPUTER: USING E-COMMERCE TO SUPPORT
THE VIRTUAL COMPANY

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INTRODUCTION

Dell Computer has been touted by itself and others as a quintessential Internet company. The Internet has given Dell a means for extending the reach and scope of its direct sales business model at a relatively low marginal cost. It has done so in part by automating functions such as product configuration, order entry, and technical support, enabling the company to grow revenues without a corresponding increase in customer service costs. Also, it has used the Internet to coordinate a network of suppliers and business partners who carry out many of the processes involved in building, distributing and supporting personal computers.   Dell refers to this network of partners as a "virtual company" linked electronically by the Internet. Another name for this type of industrial organization is the value web (Kraemer and Dedrick, 2000).

In early 2000, Dell began to redefine itself as the company that "knows how E works." Capitalizing on its reputation as an e-commerce pioneer, Dell has offered to share that expertise with its customers as they develop their own e-commerce capabilities. Dell is using the virtual company approach to expand the scope of its business without a commensurate expansion of its own work force and without making a major acquisition. It is doing so by developing a network of software and services companies that offer technologies and skills that Dell lacks in its existing value web. However, Dell remains focused on the fact that it is still a hardware company. Its e-commerce efforts are aimed at improving its own efficiency, enhancing customer satisfaction, and reaching new product markets, rather than transforming itself into a services provider as its competitors such as IBM, Compaq, and Hewlett-Packard are becoming.

A close analysis of Dell's use of the Internet and electronic commerce illustrates the strategic and organizational challenges that face any company that is serious about embracing the Internet and trying to tap its potential. It also offers insights into a new form of business organization that may become more prevalent in the networked economy.

Company Background

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).

Dell grew rapidly and in the mid-1990s, its sales reached an inflection point, soaring from $3.5 billion in 1994 to $25 billion in 1999. By 1999, Dell had become the number one PC seller in

the United States, and was number two worldwide. 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 (Kraemer, et al., 2000).

This success has taken place against the backdrop of falling PC prices, brutal competition, and enormous losses by other PC makers. Dell has not only survived, but thrived in this environment thanks to the fundamental advantages of the direct model, and to its continued efforts to improve its execution of that model. It also has taken advantage of its direct model to build strong, stable relationships with the large corporations and other organizations who are its core customers. Unlike indirect vendors, Dell knows who its customers are and has a great deal of information that it uses to provide a high level of service and support, to target customers for retention and expanded sales, and to sell additional third party hardware and software.

But even Dell has not been immune to the turmoil in the PC industry. While its most recent 26% growth rate continues to outpace the industry as a whole, it has not been able to match its earlier growth rates of 50% a year, and was hit hard by the slowdown in PC sales in late 2000.[1] The result has been a sharp fall in Dell's stock price and a reminder that Dell is vulnerable to the brutal price competition and cyclical demand of the PC industry.

Competitors

Dell's major competitors in its core corporate PC market are Compaq, IBM and Hewlett-Packard. In the consumer and small business market, it faces competition from fellow direct vendor Gateway, and from Compaq, Hewlett-Packard, Apple, and newcomer eMachines. In the portable PC business, the key competitors are Toshiba, IBM, and Compaq. In the critical server and Internet infrastructure markets, Dell competes with Sun, Compaq, HP, and IBM. As Dell moves into new service businesses such as Internet hosting, it faces new competitors such as Exodus and Corio, some of whom may also be Dell customers.

Outside the U.S., Dell competes with regional and local vendors in many markets, such as NEC, Fujitsu, and Toshiba in Japan, Fujitsu-Siemens and Olivetti in Europe, and Legend in China. It also faces strong competition from Compaq and IBM in Europe, Latin America, and the Asia-Pacific region.

<div align="center">BUSINESS STRATEGY</div>

Dell's business has been built on a direct sales, build-to-order strategy for producing and selling PCs. While Dell originally sold to hobbyists and experienced individual PC users, by the late 1980s, it was making inroads into the corporate market. Dell's direct approach appealed to MIS departments in large organizations who often didn't need or want the various services provided

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[1] Gary McWilliams, "Dell Gears Up To Slash Costs, May Trim Staff," *Wall Street Journal*, February 9, 2001, A3.

by corporate resellers. Dell concentrated its efforts on working closely with those departments to simplify their lives and lower the total cost of ownership for PCs. Gradually, Dell developed its own sales force to deal directly with CIOs and other top executives, helping penetrate corporate accounts that had long been dominated by established IT vendors such as IBM, HP and DEC.[2] Dell offered competitive prices, high levels of support, and a focus on selling and supporting PCs without the distraction of offering a full line of hardware and services.

Dell has capitalized on the inherent advantages of its business model to grow rapidly and profitably. A key advantage of direct sales and build-to-order production is that expensive inventory does not build up in the channel and lose value before it can be sold, and new products can be introduced without having to clear out old inventory in the channel. Dell's inventory turnover rate of 60 times per year compares to 12-15 times for most indirect vendors. Also, customers often pay for the final product before Dell pays suppliers for the parts that go into the PC, so that Dell operates on a negative cash conversion cycle.

Perhaps most important are the benefits that Dell gains from the direct customer relationship. Unlike indirect vendors whose channel partners generally refuse to reveal even who the final customer is, Dell knows who the end user is, what equipment it has bought from Dell, where it was shipped, and how much the customer has spent with Dell. Dell uses that information to offer add-on products and services, to coordinate maintenance and technical support, and to help the customer plan its PC replacement and upgrade cycle. With many of its customers, Dell has become what it calls a "PC outsourcer," taking responsibility for managing part or all of a customer's PC inventory, from purchase to disposition.

Dell's manufacturing operations are set up to support this business model by building PCs to a customer's specifications, pre-loading software and a hard drive "image" in the factory, and providing an asset tag that can be scanned to keep track of the PC throughout its lifecycle. 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 information systems.[3]

Redefining the Business Model: Dell as an E-commerce Company

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. Unlike indirect vendors such as Apple, IBM, HP and Compaq, Dell did not have to worry about channel conflict with resellers and distributors when it began 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.

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[2] David Martin Kaplan, "Evolution of Business Models: The Case of Dell and Compaq in Sweden," Working paper, Stockholm School of Economics, February 2000.
[3] The Dell model and its execution, including a detailed description of Dell's internal information systems is analyzed in Kraemer et al. (2000).

By 2000, Dell was doing $50 million a day in web-enabled sales, but this figure was not the whole story. Dell also used the Internet to link itself more tightly to its large customers by developing extranets called Premier Pages (now renamed Premier Dell.com). Dell had developed over 50,000 Premier Pages for thousands of business customers by mid-2000. These are used for configuration, ordering, services, and support, all customized to the customer's systems and needs. Smaller companies and consumers could buy PCs, peripherals, software and other items online from Dell.com, and receive technical support and other services at the Dell web site.

Equally important was Dell's effort to use the Internet to coordinate its entire value network, including suppliers, logistics providers, distributors of third-party products, system integrators, and service providers. All of this was driven by the tight information linkages between Dell and its customers.

Dell's successful use of the Internet drew the attention of the media and other companies, including its customers. The company saw an opportunity to capitalize on its growing reputation as an e-commerce innovator and redefine itself as a knowledgeable provider of e-commerce infrastructure to its customers. Dell's public relations machine, with Michael Dell as point man, drove home the message that Dell knows the Internet and could help its customers achieve similar success online. Dell began to market itself as the company that "knows how 'E' works" and can provide the infrastructure that companies need to make it work for them.[4]

Dell has executed its "E-Works" strategy through a new Information Infrastructure sales force and through partnerships with service and software providers, rather than by transforming itself into a services company. Dell brings its corporate customers to the table and offers itself as a model for success on the Internet, but lets its partners do the actual labor-intensive consulting business. Thus Dell taps a high growth market and improves its margins without needing to hire an army of consultants. Dell also tried to expand its e-commerce business in 2000 by setting up an online exchange in partnership with Ariba and others, but pulled the plug on the exchange in 2001.

Dell does make money from services, but most of its revenues still come from selling hardware as part of the e-business solution. This hardware includes high margin items such as large servers and storage devices needed to support e-commerce, as well as commodity desktops and laptops.

Dell has expanded and revamped its product line to meet the demands of the e-commerce market. It built Dell.com on Dell servers running Windows NT, and was quick to adopt Windows 2000 internally and in its server line to take advantage of the capabilities of the upgraded operating system. It also has designated Linux as one of its three core operating

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[4] To reinforce this message, Dell brings corporate customers (which involve acquisitions over several million dollars) to its facilities and shows them how it uses its PCs, servers and storage products and its intranet, extranets and the Internet to run its own business. For new accounts, the purpose is to show the Dell model, how it works and how Dell can do it better than competitors. For existing accounts, it is to expand the relationship by showing new ways that Dell can add value to customers. Interview with Reginald Freake, Dell Computer, Ireland, November 2000.

platforms (along with Windows and Novell), taking advantage of the capabilities and popularity of Linux with ISPs and e-commerce application providers. Dell has increased its R&D investments to enhance the capabilities of its server line, while still sticking to the Intel hardware platform.

Less successful was an effort to develop a simpler net-oriented PC. In 1999, Dell introduced a sleek low-cost model called the WebPC, but withdrew it after only seven months due to slow sales. [5]

Another piece of Dell's e-commerce strategy has been Dell Ventures, which has invested $700 million in about 50 Internet companies (as of July 2000), in areas including broadband and wireless communications, business-to-business and business-to-consumer e-commerce, ASPs, server and storage infrastructure, Internet content, and e-consulting.[6] These investments give Dell access to new technologies without expanding its own R&D activities, and may pay off financially if the companies go public.

ORGANIZATION OF BUSINESS ACTIVITIES

Internal Organization

Dell is organized along geographic lines into the Americas, Asia-Pacific and Japan, and Europe. Corporate headquarters is in Round Rock, Texas, near Austin. The company decided in the mid-1990s that in order to manage a company that was growing at 50% a year, it needed to decentralize decision making rather than try to control everything from the U.S. Each of the regions has its own regional headquarters (Japan has a separate headquarters), its own manufacturing facilities, and its own IT infrastructure.

Dell's business activities are organized in each region around different customer segments. These vary somewhat, but generally include (1) relationship (large corporate) customers, (2) home and small business (sometimes called transaction customers), and (3) public sector (government and educational) customers.[7]

This segmentation is reflected in Dell's product mix, which has different lines for each segment, in its marketing strategies, which vary by segment, and in its e-commerce and Internet strategies. For instance, services such as DellPremier.com extranets are geared toward large relationship customers, while a more limited set of online services is offered to home and small business customers on Dell.com.

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[5] Gary McWilliams, "Dell Computer Halts Sale of WebPC Line After Only 7 Months" The Wall Street Journal, 07/11/2000: B6

[6] http://www.dell.com/us/en/gen/corporate/howeworks_001_ventures.htm

[7] Dell web sites for different countries.

Product development

Dell's product line is similar across different geographies, with adaptations for local requirements such as language, communications protocols and power sources. It offers the Optiplex desktop line for corporate customers and Dimension desktops for small businesses and consumers. In notebooks, it targets the Latitude line to corporate customers and the Inspiron line to consumers and small businesses. Its enterprise systems include the Precision line of workstations and PowerEdge servers, both based on the Intel architecture. More recently, Dell began to offer the PowerApp line of server appliances.

Dell also sells the PowerVault line of storage products, including a storage area network solution for Windows NT environments. Since purchasing ConvergeNet Technologies in 1999, Dell is able to offer storage devices and systems to connect to any server running Unix, Windows NT/2000, Netware or Linux.

Dell customers can order PCs with a variety of configurations for items such as processor speed, memory, storage, sound and video, networking, and monitors. For the most part, however, Dell keeps its configurations fairly limited, with only a few options for each item. But even so, there are thousands of possible permutations for each product, and several products in each line. One estimate is that Dell offers a total of 1.6 million different possible product configurations for all its product lines.[8]

Dell works with partners such as Microsoft and Intel on product development, and with contract manufacturers such as Quanta for product engineering. By leveraging the innovations of the PC industry value chain, Dell minimizes its R&D costs. Its own R&D budget is only about 1.6% of revenues, compared to 4-7% for IBM, HP, Compaq and Apple, who are supporting their own technology platforms.

Dell also offers a wide range of third party software and accessories for sale through its DellWare (for relationship and public sector customers) and Gigabuys (HSB) channels. Software also can be installed at the factory—standard applications such as Microsoft Office for all customers, and non-standard or custom applications for relationship customers. In general, then, Dell's product strategy is aimed at enabling it to capture both new customers and a larger share of its current customers' dollars—from PCs to servers and storage; from software to services; and from its own products to third party products. In return, Dell gives customers the convenience of buying a full range of products and services from one source.

Component Sourcing

Dell's main suppliers come from the same group as those of other PC makers, e.g., Intel for microprocessors; Seagate, Quantum, Maxtor and IBM for hard drives; Samsung, Toshiba and Micron for DRAM; Sony, Phillips, Nokia, Samsung and Acer for monitors; contract manufacturers (CMs) such as SCI and Solectron for printed circuit board assemblies; Hon Hai

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[8] David Martin Kaplan, "Evolution of Business Models: The Case of Dell and Compaq in Sweden," Working paper, Stockholm School of Economics, February 2000.

for box builds and connectors; and a variety of Taiwanese original equipment manufacturers (OEMs) for other components and contract manufacturing. Dell's lower-end notebook computers are manufactured entirely by Taiwanese suppliers (mainly Quanta and Arima), whereas only the base units of higher-end notebooks are outsourced as Dell now does final configuration itself. Unlike other PC makers, Dell has relied on Intel as a sole source of microprocessors, a decision that simplifies product development, but which can be costly if Intel is unable to meet the market's demand, as happened in late 1999 and early 2000. About 70% of Dell's procurement is done in the Asia-Pacific region, even though its manufacturing is concentrated in the U.S.

Dell has streamlined both procurement and inventory by redesigning its computers so that different models utilize as many of the same components as possible. This reduces the number of inventory parts, the cost of parts from economies of scale, and the complexity of managing their procurement. Between 1992 and 1997, Dell reduced its number of suppliers by 75 percent. About fifteen of these are "key" suppliers who provide about 85 percent of Dell's materials.[9] Dell works with these suppliers in multiyear planning and negotiating, thereby reducing the complexity of managing its supply chain.

Manufacturing and logistics

Dell organizes manufacturing by region, operating one or more assembly plants to serve its major markets. Plants in the Austin, Texas area and Nashville, Tennessee serve North America; Eldorado do Sul, Brazil serves Brazil and South America; Penang, Malaysia serves the Asia-Pacific region; Xiamen, China serves China; and Limerick, Ireland serves Europe, the Middle East and Africa.

Dell's build-to-order manufacturing process can turn an order around in under a week from the time an order is received until the PC is delivered to the customer. The actual time of assembly is as little as seven hours, including software installation and extensive system testing.

A key to manufacturing is managing inbound logistics with suppliers and contract manufacturers. To have the parts it needs at the right time to assemble a PC, Dell requires suppliers to hold inventory in warehouses within a 15-30 minute drive of its plants. Dell then informs the warehouse when parts must be replenished, and they are trucked to the plant, where they are pulled off of the trucks as needed. When a PC is fully assembled, it is sent to an outbound logistics hub where it is joined with the monitor and peripherals so that the complete system arrives at the customer's site together. All of these logistics are coordinated by Dell through its internal IT systems and via electronic linkages with suppliers, its own logistics hubs, shipping companies, and distributors who handle third party items.

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[9] Kenneth L. Kraemer, Jason Dedrick, and Sandra Yamashiro (2000). "Dell Computer: refining and extending the business model with IT," *The Information Society*, 16: 5-21.

Sales and marketing

Relationship and public sector customers account for about 65% of Dell's revenues overall, and as much as 80% in Europe.[10] All these accounts are initially secured by field-based sales representatives. They are serviced by these field reps and a support team of telephone service reps dedicated to these accounts. Small businesses and consumers are served by several thousand phone reps who can call up historical sales records to assist the customers in choosing systems that match their prior purchase pattern. Approximately one-third of Dell's employee base is in sales and marketing.

The biggest change in Dell's sales and marketing operations has been the introduction of the Internet to handle online sales and to support Dell's sales representatives. At first there was resistance on the part of the country managers and sales reps, who feared losing commissions if customers purchased online or through outbound call centers. To resolve this potential internal channel conflict, Dell changed its incentive system so that country managers and sales reps would receive credit for a sale to their customer accounts, whether it was made on the phone, online, or in person.

External Relationships: From Value Chain to Value Web

Dell's core PC business was organized along the lines of a traditional value chain. Like most other PC companies, it concentrated on building and selling systems, relying on others to provide components, software and services. Unlike most others, however, it sold directly to the end user, thus cutting out the distributor and reseller (Figures 1 and 2).

In terms of designing, building and delivering PCs, this is still roughly the way Dell operates, although a significant share of Dell's products (particularly notebooks) are built by contract manufacturers and shipped directly to the customer. However, as Dell expands its boundaries beyond simply selling PCs, it has replaced the simple value chain with a new model that we call the value web or the virtual corporation.

Figure 1. Indirect PC value chain

Figure 2. Direct PC value chain: Dell's hardware delivery system

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[10] Interview with Sean Corkery, General Manager EMF3, Dell Ireland, November 2000.

Three key points stand out in the value web model (Figure 3). First is Dell's powerful role in coordination and control of the value network, which its direct relationship with the end user allows it to play. Whatever the customer wants or needs, it turns to Dell to provide. Dell then relays the necessary information to its suppliers and business partners who provide the actual service. This is shown by the fact that all of the information flows in Figure 3 are channeled through Dell.[11]

Figure 3. Value Web: Dell's virtual company

—————— Physical flows, including products and services

— — — — —· Information flows
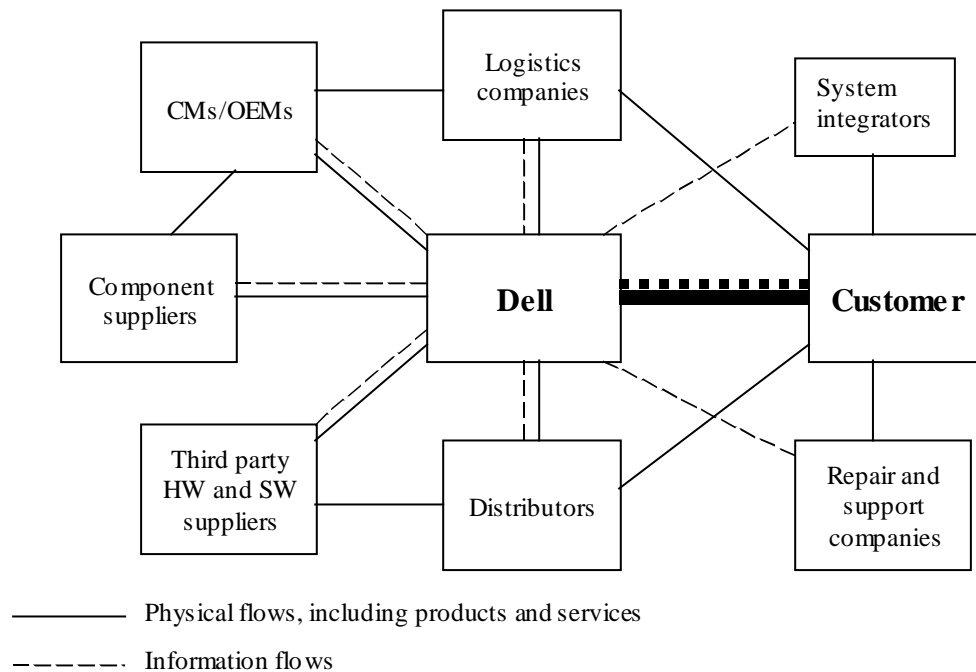
Second is the close physical integration of Dell with its suppliers and business partners. Dell's suppliers are not only located close to the plant, but supplier personnel are actually located on the plant floor calling for material from the warehouse using information from Dell's extranet. For example, suppliers not only manage the flow of materials to the plant, but also within the plant, holding inventory until the moment that it actually becomes part of each computer that is built. Similarly, the building of boxes for shipping is done by the box supplier on the factory floor just prior to the moment the computer is loaded into the box. Such physical integration not only reduces Dell's inventory holding costs, but creates personnel efficiencies for its suppliers and builds a closer partnership between Dell and the suppliers.

Third is the importance of information technology, the Internet, and other electronic communications (e.g., e-mail, EDI) in enabling Dell to coordinate this web of close and distant relationships. Information flows back and forth between Dell and the customer via the Internet, triggering orders, service calls and other communications to other parts of the value web. For

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[11] Of course there is communication among the other parties in some cases, such as components suppliers notifying a contract manufacturer of a shipment, but most of the important information flows are between Dell and the members of its value web.

instance, if a customer's hard drive crashes, the information goes from a Dell technical support person into Dell's internal service and support systems. A new drive is ordered and shipped to a Dell service provider, which dispatches a repair person to install the drive. Information about the drive that crashed goes into Dell's databases and is relayed to the supplier and plant that provided it.

These are just a few examples of hundreds or thousands of different types of actions that must be coordinated internally and with external partners. Without effective information systems, such a structure could not function in a rapidly changing business. Much of that information flow now takes place over inter-organizational systems linked to the Internet.

THE INTERNET AND E-COMMERCE

Dell has been an early and avid user of the Internet, and Michael Dell has preached the Internet message to audiences around the world for the past several years. In some cases, the company's rhetoric has preceded its actual practice, not an unusual occurrence in the computer industry, but there is no doubt that it leads the PC industry in most indicators of e-commerce.

Evolutionary Development

Dell's use of the Internet and e-commerce did not spring up overnight, but evolved with the technology and with new perceptions of the opportunities it offered. Dell began experimenting with the Internet and online shopping in 1994, after it withdrew from the retail market in the U.S. It hoped that electronic selling would provide a new channel to expand sales and restore growth. Initially, Dell experimented with kiosks in various locations and with online shopping services, through which customers could place orders directly to Dell.

Around the same time, Dell set up Dellnet (now called Inside.dell.com), an intranet for its own employees. It hooked Dellnet up to its internal IT systems to give employees easy access to information they needed to do their jobs better, such as financial reports, customer data, product information, technical documents, and their own personnel information such as retirement and health benefits.

In 1995, after the Internet was opened up to commercial use, Dell created the Dell.com web site to provide information to customers, starting with technical support and product information. It also put out information on the firm such as annual reports, Dell's stock price, and other financial statistics.

In 1996, Dell began to offer online shopping for its PCs, targeted mainly at its catalog customers. Customers could select and configure a model, get a price quote, and purchase the PC at that price online or by phone. After ordering, the customer received an e-mail confirmation and could check on the progress of the order through Dell's order status system.[12]

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[12] Early on, most of Dell's online orders were incomplete, usually because the customer had not entered a credit card number, and required a follow-up call from a Dell sales rep. Only 20% of web transactions were completed

Using Dell's definition, the company was selling $1 million per day online by the end of 1996. By the fall of 1997, the figure was $3 million per day.[13]

In most cases, capabilities were introduced first in the U.S. market, and then gradually rolled out in other markets. For instance, the online ordering capability that was introduced in July 1996 became available in some European markets such as the UK, Ireland and Sweden in April 1997.

By 1997, Dell was aware of the cost savings it could achieve by moving customers from the phone to the Internet. It also felt that the Internet allowed it to duplicate or even enhance many of the capabilities of the call center. Customers could take themselves through the configuration process and price as many configurations as they liked, with the whole process visible on the screen in front of them. They could print out different configurations and prices and weigh the costs and benefits of different features. Customers also could get technical support information without waiting on hold for a technical support person, and in many cases could solve their own problems.

The view within Dell is that the Internet and e-commerce are the perfect extension of the direct sales model and should be adopted by Dell as broadly as possible.[14] This means embedding the Internet into virtually every activity in every market around the world, a process that continues to the present. The success to date is uneven due to various country barriers and limitations.[15] The list of country barriers and limitations cited by Dell is long. It includes such things as language, communication protocols, power supply, power cords, financial practices, preferences for national computer champions, and government regulation among others.

These barriers exist for all the multinational PC vendors. The more fundamental limitation that Dell faces is the lack of market reach inherent in the direct model, especially in markets where there are good local competitors, consumer preferences for local brands and well-entrenched distribution channels. While Dell can reach its established customers through the Internet, it cannot reach new corporate and government customers this way. It must reach them through its direct sales force and it must do so one by one. It does not have the benefit of distribution channels to extend its reach. It must rely on advertising, marketing, sales representatives and outbound telephone sales.

So long as Dell is able to focus on large corporate customers, this strategy is effective. However, the large corporate market is becoming a replacement market in many countries and

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entirely online in 1997. V. Kasturi Rangan and Marie Bell, "Dell Online," Harvard Business School case #9-598-116, April 15, 1998.

[13] Generally, online sales are defined as those in which Dell receives the order over the web from a customer even if payment or other aspects might be handled separately. The number of online sales is large because of Dell Premier Pages more so than because of Dell Online. Premier Pages are used to place orders by end users and others in large corporate accounts. The overall contract is negotiated by the direct sales force but the actual orders for computers come in small quantities of 1, 2 or 3 units so the percentage of online sales is naturally high. Interview with Maurice Cowey, Vice President, Preferred Accounts Division, Dell EMEA, December 2000.

[14] David Martin Kaplan, "Evolution of Business Models: The Case of Dell and Compaq in Sweden," Working paper, Stockholm School of Economics, February 2000.

[15] Interviews with Sean Corkery, General Manager EMF3 and Reginald Freake, Industry Relations, Limerick, Ireland, November 2000.

therefore Dell must seek new markets for growth, such as the home and small business markets. Dell faces a more difficult time reaching and closing sales in these markets where "local" service and support is key—functions provided by the distribution channel for other vendors. Dell is simultaneously working with resellers, system integrators and others while pushing hard to extend the capabilities of the Internet and e-commerce for creating more meaningful relationships with these customers.

The Internet and e-commerce are fundamental to Dell's business, as befits a company that now defines itself as an Internet infrastructure company. The incorporation of e-commerce into the core of the business is manifested in three ways. These include Dell's use of the technology (1) in its relationships with customers, (2) in coordinating its value web, and (3) in refocusing its market message to emphasize its ability to provide e-commerce solutions to its customers.

Dell's use of the technology in customer relationships

Dell has applied the Internet to all aspects of customer relationships, from sales and marketing to order entry to technical support. It does so partly to support existing channels such as the direct sales force and call centers by providing them with better information and automating their routine tasks. It also has provided self-service tools to customers so that they can order online, track order status, or solve a technical problem via the Internet or an extranet. These applications make Dell's sales and call center staff more effective and productive and reduce staffing required to support a growing customer base. They also give customers access to the same information and tools available to Dell's own personnel, such as product configurators, product specifications, and technical support documents.

For instance, while Dell relies heavily on its direct sales force to win corporate contracts, it supports its sales force with the Internet from the beginning. Dell's sales teams can build a prototype Premier Page extranet for the customer to demonstrate the types of capabilities the customer will enjoy if they select Dell as a supplier. "We often set up Premier Pages for prospective customers before we've won their business. It blows them away," says Chris Halligan, who runs business-to-business e-commerce.[16] Also, sales people working on existing accounts can tap into Dell's customer database via the Internet.

Online sales

Dell sells its own products at the dell.com website. Customers in the U.S. are segmented on the home page into home and home office, medium and large organizations, Internet providers, health care businesses, federal government, state and local government, and education. Each customer segment has a different mix of products and services available.

Customers can select and price different configurations with Dell's online configurator. When they are ready to buy, their order is sent to a shopping cart. They can also select various add-ons such as software, peripherals, digital cameras, PDAs, etc. on the Gigabuys or DellWare sites and add those to the same shopping cart. Once an order is entered, the customer receives an order number that can be used to track order status until it is delivered.

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[16] Eryn Brown, "Selling To Businesses Dell Computer," *Fortune*, 5/24/1999, Page 114.

Dell created over 50,000 Premier Page extranets for corporate and small business customers in 13 languages around the world.[17] Premier Pages are customized for each customer and include capabilities for procurement, asset management, software upgrading, and technical support. Large relationship customers can have Premier Pages customized further to link to their own internal procurement systems, allowing orders to be sent directly from the customer's information systems to Dell's order management system.

Dell's account teams work with customers to set up Premier Pages, specifying access levels and setting up user names and passwords for employees, and customizing the information and services that will be available. Dell also provides tools for customers to create their own pages. The major services available through Premier Pages include:

- *Purchase history reports*: A complete history of a customer's purchases from Dell, including PO number, order number, date, SKUs, quantity, shipment dates.
- *Standard configurations*: To simplify a customer's PC administration processes (installation, upgrades, help desk, technical support), the customer can specify a limited set of configurations for different employees. These are available for ordering on the customer's Premier Pages at the price negotiated between Dell and the customer.
- *Paperless online purchase orders*: Dell and the customer sign a legal agreement that lets the customer place orders without mailing or faxing a signed purchase order. This allows the entire ordering process, from configuration to payment, to be done online, saving time and increasing accuracy.
- *ImageWatch*: A roadmap of future product plans available to large customers to help them plan their own IT strategies.

Dell relaunched its Premier Pages as "DellPremier.com" in September 2000 in the U.S., followed in the months after in Asia-Pacific and Europe. The relaunch included a new look and better navigation tools.

Online service and support

Service and support is an expensive and labor-intensive activity for PC companies, which must provide technical support for complex systems with a wide variety of hardware and software configurations, many of which are added on by the customer. Dell is at an advantage in that much of its business is with large organizations that have their own MIS departments and help desks to support users. Home and small business support is usually provided directly to the end user, and costs more per PC to provide.

Online support was originally developed by the Support Technology Online (STO) team, which grew up in the HSB segment as support.dell.com. In late 1999, Dell created separate STO

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[17] Premier Pages in the U.S. are much simpler than elsewhere as they involve only three languages and a single currency. In contrast, EMEA has about 5,000 Premier Pages, but they are in 18 different countries, 13 different languages, 18 different currencies and 18 different tax rates (including different central, state and local government rates). Interview with Maurice Cowey, Vice President, Preferred Accounts Division, Dell EMEA, December 2000.

groups for relationship and transaction customers, each part of those groups' service organizations.

Dell offers several service tools online. These are available to home and small business customers at support.dell.com, and to relationship customers via the DellPremier.com extranet:

- *Order status tracking* -- Once an order is placed, customers can track it until it is delivered.
- *Resolution Assistant* -- software pre-loaded on a Dell PC that gathers information and sends it to a technician when the customer has a problem. The information is matched against an automated knowledge base. If possible, a MAP--an executable module that automates resolution--is sent to the PC and the fix is done automatically. Resolution Assistant cuts the length of service calls and improves accuracy in diagnosis.   It also reduces the number of dispatches for onsite support.
- *Dell Knowledge Base* -- A database containing product information, frequently asked questions, third party knowledge and other documents specific to a particular Dell product.
- *Ask Dudley* -- A natural language searchable database of technical information using a customized version of the Ask Jeeves search engine.
- *File Library* – Downloadable drivers, utilities and other updates for Dell systems.
- *Dell Software Tips* –Library of quick hints and tips for operating systems and office applications.
- *Pro-active services* – Pro-active notification services on warranty status, system age related information, file drivers, and order status.
- *Dell Talk*—a monitored bulletin board for Dell customers to share information. Dell has built a community where its customers and loyalists can help each other with technical problems and questions. Dell doesn't censor the discussion, but monitors it to ensure accuracy. Users sometimes give out incorrect information and Dell will intervene with correct information. The volume of activity on Dell Talk is growing fast, increasing more than tenfold in the first few months of 2000. Users are about equally divided between relationship and transaction customers.[18]

With the launch of Dell Premier Support.dell.com in September 2000, Dell relabeled its Help Tech service as "Premier Support" for relationship customers.[19] Technical Support for corporate and public sector clients is handled by the Relationship Support Technology Online (STO) group. The primary customers for the Relationship STO are the individuals that support the corporate and public sector end users. This includes the help desks, MIS departments, IT professionals and technicians. Dell's relationship customers have access to all of the tools available to HSB customers online, and also have customized applications specific to their account for multiple systems and platforms.

Unlike individual users, help desks and MIS organizations must deal with multiple systems, and with problems that arise from networking and client-server environments. For some large accounts, Dell may act as the help desk function for Dell equipment, as Dell's technicians and online offerings are highly experienced in troubleshooting and diagnosing system issues.

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[18] Interview with Ganesh Lakshminarayanan, Acting Director, online service and support, home and small business, July 2000.
[19] Interview with Chris Martin, Senior Manager, Relationship Support Technology Online (STO), August 2000.

The customer profile and history is very important in providing service and support. If the user enters a customer number or system identification number, he or she can get a personal support site that has the machine configuration and the history of what has happened with that machine since it was bought. The support strategy is based on what Dell calls virtual integration—getting customers closer to the knowledge, and inside out/outside in—giving the internal technicians the same set of tools and knowledge content as the outside customer.

Dell gives customers a choice of venues for support, including phone and online support. They like people to use the web, but don't force them to. The breakdown of help incidents for HSB customers as of mid-2000 was as follows:
- 37% of incidents use the web alone for support
- 13% use both web and phone
- About 50% use the phone alone

Dell finds that people who buy a PC online are more likely to get service and support there, while people who buy by phone will use phone service.

Summary

Dell uses its online sales, premier pages and online support to open up some if its own internal systems to its customers. It also allows corporate customers to link up their own systems such as finance, procurement, MIS, and help desk to Dell's systems via the Internet and extranets (Figure 4). These links enable Dell to keep track of every customer, to inventory equipment upgrades and add-ons, to handle service and support requests directly, to facilitate entry into service and support partners, and to capture feedback on customer satisfaction with its products and service partners. For some large corporate customers, the information network is richer still, including the complete inventory of PCs worldwide for an individual company, the replacement cycle, and the disposition plans.

This extensive information bridge binds Dell more closely with its customers and allows Dell to provide better service to its customers. The Internet and e-commerce enrich the direct customer relationship that is at the core of Dell's business model. Through this relationship, Dell can channel the capabilities of its value web to provide a wider range of services to its customers.

Dell's use of technology in coordinating the value web

The Internet and information technology play an important role in coordinating Dell's value web (Figure 4). Dell uses electronic data interchange (EDI) technology with all of its business partners to send and receive standard transaction information such as purchase orders, invoices, and shipping schedules. With key suppliers and contract manufacturers, it also sets up extranets that give these partners access to order information and forecasts from Dell's internal systems, including the Dell Order Management System (DOMS) and i2.[20]

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[20] For details on Dell's internal IT systems, see Kraemer et al., 2000.

Figure 4. Dell's IT and E-commerce applications
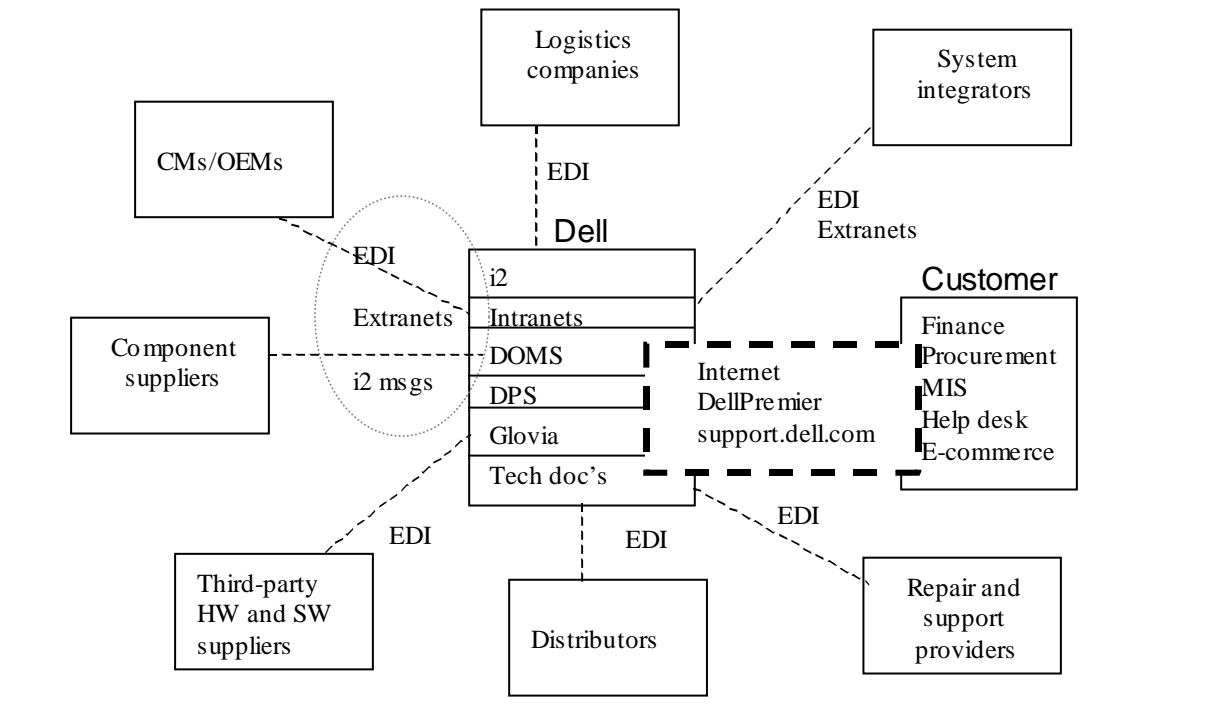
Coordinating with service partners

Dell provides technical support to home and small business customers through phone and extensive web-based support. It outsources on-site repairs to HSB customers to a company called BancTec. It provides system integration and other services and support to corporate customers through relationships with Unisys, Wang and IBM. These relationships with service providers are coordinated by extranet, email and EDI links. When on-site service is needed, Dell dispatches someone from BancTec or another partner who handles a particular corporate account, and also ships the necessary parts if they are not on hand. Ensuring timely and accurate response by these service partners involves electronic communications.

Now, Dell has EDI links with its partners and uses EDI messages to dispatch service technicians. In the future, Dell's vision is to integrate the customer support applications of its own support people, its service partners (e.g., Unisys, Wang), and its customers. Dell is considering adopting XML to allow integration of these different case management systems and share incident report information.[21]

The objective of online service and support is to reduce total costs and improve customer satisfaction, rather than just focus on a specific cost element such as call center costs or web site development. There is a good relationship between product groups and service/support. Product groups have incentives to improve users' "out of the box" experience and reduce support costs by improving product quality and documentation.

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[21] Interview with Chris Martin, Senior Manager, Relationship Support Technology Online (STO), August, 2000.

Coordinating with suppliers

Dell uses its extranet and EDI to coordinate with its first-tier suppliers, including components suppliers, contract manufacturers and third party hardware and software suppliers (Figure 4). These in turn communicate with their own suppliers. Suppliers have access to information from DOMS to track sales of their own components or peripherals in order to replenish Dell's supply hub when necessary. They also receive demand and production forecasts from Dell's newly installed i2 planning applications.

Demand forecasts are produced for quarterly and monthly periods and shared with suppliers so they can plan for material and sub-supplier procurement. Production forecasts are produced for daily, weekly, monthly, and quarterly periods and are shared with suppliers so they can make supply commitments and then supply to the close-in schedules. Dell does not formally place orders with its suppliers. Rather, it relies on them to monitor demand and production forecasts and to respond to those forecasts. It is unclear how this affects supplier need for inventory, but it is claimed by Dell that the tight integration of information allows suppliers as well as Dell to reduce their inventory.

Selling e-commerce solutions

Dell is promoting itself as the company that "knows how 'E' works," and is offering to share that knowledge with its customers. To do so, it is offering a variety of e-commerce hardware, software and services under the Dell E Works program (www.delleworks.com). There are separate E Works services for SMB, health care, government and education customers, and for Internet companies such as ISPs, ASPs and web hosters.

A statement by Dell vice-chairman Kevin Rollins illustrates how Dell is touting its Internet expertise to sell itself as the single point of contact for customers' e-business needs.

"Dell E Works represents best-in-class solutions for any organization of any size that wants to run their e-business through a single point of contact," said Dell Vice Chairman Kevin Rollins. "Naturally you're going to want that single point of contact to be an expert on Web business. With more than $40 million a day in sales over the Internet, Dell provides customers with a rare combination of products, services and experience."[22]

The Dell E Works program includes hardware and software configurations ("solutions") tailored to e-commerce, and includes a variety of services to support e-commerce customers. These are delivered in conjunction with various software and services companies through a series of partnerships announced throughout 2000. Dell created a new unit, the Dell Expert Services Group, to manage the E Works projects and alliances. For instance:

- Dell announced a partnership in April 2000 with Arthur Andersen and Gen-3 to offer e-commerce consulting services to mid-sized businesses in North America. Speaking of Gen3 and Arthur Andersen, Kevin Rollins said, "They already have an army of people

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[22] "Dell, Intel and Microsoft Work to Expand Dell E Works Products and Services for Web Businesses," Dell press release, Business Wire, 8/8/2000

trained and ready to serve this market. We bring existing customers, and they bring knowledge about how to complete a consulting project."[23]

- In March 2000, Dell announced an agreement with business-to-business software company Ariba to develop an electronic marketplace for Dell's small and medium-sized customers. The marketplace was designed to give customers a single site for purchasing office supplies and other goods and services from different suppliers.[24] In September 2000, Dell unveiled the Dell Marketplace with considerable publicity. However, in February 2001, Dell pulled the plug on the Dell Marketplace, saying that customer interest was not sufficient to justify continued operation. Analysts pointed out that Dell had not attracted any new vendors beyond the original trio of Pitney-Bowes, 3M, and Motorola.[25]

- In August 2000, Dell announced an alliance with Intel and Microsoft to promote the use of Intel-based hardware from Dell, running Windows 2000 and Microsoft's .NET software, for e-commerce applications. The alliance targets Internet startups in particular, offering financing and leasing for Internet infrastructure, capital investment in some startups, and access to Internet consultants from Andersen and Gen3.[26]

By August of 2000, Dell stated that 8,000 companies had signed up for E Works, and that Dell had made $1.5 billion in financing commitments to the Internet infrastructure market.[27]

In February 2000, Dell announced it would create a web hosting business to support small and medium-sized businesses in the U.S. Dell is entering the business through a partnership with Interliant, an Internet service provider.[28] Dell brings in the customers and maintains the direct relationship, while Interliant provides the actual service. Dell offers services such as site design services and tools, and site promotion.[29] The decision to offer web hosting puts Dell in competition with its own customers in the ISP and web hosting business. Compaq, for one, responded by saying it would never offer web hosting and compete with its customers.

As of February 2001, it appeared that Dell was downplaying its services business. Not only had it closed the Dell Marketplace, but E-works had been demoted from the home page of the Dell website to a location which can only be accessed by typing in the delleworks URL (in other words, it is nearly impossible to find by navigating from the home page). Dell was still promoting its web hosting and consulting businesses, but within the context of various services offered to its different customer segments.

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[23] Jerry Mahoney and John Pletz, "Dell Continues Pursuit of Its Internet Strategy," Austin American-Statesman, 4/6/2000.

[24] "Dell and Ariba Partner for B2B e-Commerce," Dell press release, PR Newswire, 3/13/2000

[25] Todd R. Weiss, "Dell closes online marketplace after just four months, Computerworld, February 7, 2001. http://www.computerworld.com/cwi/story/0,1199,NAV47_STO57480,00.html

[26] "Dell, Intel and Microsoft Work to Expand Dell E Works Products and Services for Web Businesses," Dell press release, Business Wire, 8/8/2000.

[27] "Dell, Intel and Microsoft Work to Expand Dell E Works Products and Services for Web Businesses," Dell press release, Business Wire, 8/8/2000.

[28] Dan Briody, "Dell plunges into application hosting sector," InfoWorld.com, Feb 18, 2000.

[29] From dell.host.com

Organization of E-Commerce

E-commerce at Dell was originally developed by the Dell Online group, which created Dell.com and the Premier Pages. Dell Online has since been divided up among the company's business units, each of which develops online content for their own markets. E-commerce is coordinated by a global e-commerce council, which sets overall strategy and standards.

Online sales are located within the marketing organizations of the different units, while service and support are under the customer service organizations. Some corporate online efforts cover all the business units, at least within the Americas organization. Technical support information for different products and customers is created and updated by engineers and technicians from each business unit. Likewise, there is a common configurator used by the whole company, but the individual product configurations are set up by the business units responsible for each product.

The relationship between Dell's online units and Dell's IT department has been loose, but is becoming closer. As one manager described it, "Dell Online was initially separated from IT to free it from IT's shackles. Intranets were springing up all over. People would go to IT and ask about a project and be told it would cost $1 million and take a year to complete. So some young kid would do it for $50K in two months. But it led to chaos, with no overall structure or management. Now we are moving to closer integration between IT and Dell Online. Dell Online needs to have more discipline and a better structure while IT needs to have more of a business focus."[30]

While there are different Dell Online groups in each region (Europe, Americas, Asia-Pacific, Japan), they work quite closely to standardize practices and thus reduce development costs. There are representatives from each region on the e-commerce council that sets global standards and practices for the company.

Global e-commerce

Dell initially entered many international markets with an indirect or hybrid approach that used local resellers, rather than making the investments needed for the full-fledged direct model. However, the company now does business direct in most major markets, and has entered new markets such as Brazil and China with the direct model from the start.

Online sales

Selling online is more difficult in many countries outside the U.S., as customers often do not have credit cards, there are inadequate distribution and delivery systems, and some countries place restrictions on direct sales. Many PC users also are less experienced and expect personal handholding from a dealer or reseller. Online sales to business can be hampered by traditional practices, such as the requirement for multiple signatures on a purchase order (common in Japan).

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[30] Interview with Kevin Baker, Dell Online Japan, 3-00

In spite of these difficulties, Dell's direct model has translated surprisingly well to global markets, and its overseas sales have matched the torrid growth rate of its U.S. sales. Online sales are quite substantial in many markets. In Japan, for instance, 80% of Dell's sales are driven by the web and 40% of sales are actually online. Dell Japan has built about 1500 Premier Pages for its customers, even though its customer base is more skewed toward small businesses there.[31]

For Asia-Pacific, about 50% of sales are web-enabled, comparable to the U.S.[32] Because Dell has entered most of these markets fairly recently, they have emphasized online sales where possible, rather than phone sales. Dell sells direct in Australia, New Zealand, Singapore, Malaysia, China, Taiwan, Korea and Hong Kong. In the Philippines and Indonesia, Dell uses resellers, while India is a hybrid with resellers and direct sales. The biggest market in the region is China, which accounts for about 30% of Asia-Pacific sales (excluding Japan). Dell has not been pushing online sales in China, and online sales there are mostly via Premier Pages to relationship customers. Chinese consumers and small businesses mostly don't have credit cards or other means of online payment, and there are problems with distribution coverage in much of the sprawling country.

The overall proportion of online sales in Europe[33] is also said to be similar to the U.S., but varies considerably from country to country. Dell has a greater proportion of online sales in the UK, Ireland and Sweden than in France, Germany or Italy.[34] The former are English-language markets and among the first targeted by Dell when it entered Europe and later introduced online sales. About 80% of Dell sales are to relationship customers and 20% to home and small business, with consumers representing only 5% of this latter figure.[35]

Dell initially tried to sell mainly through focused advertising, outbound call centers and the Internet from its European base in Limerick, but had to adapt its approach. It developed an in-country presence and tailored its sales, service and support programs depending on customer category, overall maturity of the national market, and the composition of its customers in a particular market. Dell created account management teams consisting of sales, customer service and technical support representatives who were designated to form long-term customer relationships and to provide a single source of assistance from order placement to fulfillment to service and support to technology transition. Dell now has integrated offices for sales, marketing and help desks located in 17 European countries where they are more visible, in direct contact with customers and more attuned to the nuances of each market. Currently, the

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[31] Interview with Kevin Baker, Dell Online Japan, 3-00

[32] Interview with Jack Cantillon, Dell Online Asia-Pacific, 3-00

[33] We use Europe as shorthand for EMEA—Europe, the Middle East and Africa. Most Dell sales are to the English-speaking countries (including South Africa) within EMEA.

[34] Dell is number one in PC sales in the UK, Ireland and Sweden, but only #4 in France, #5 in Germany and #6 in Italy.

[35] Interviews with Sean Corkery, General Manager, EMF3, and Reginald Freake, Industry Relations, Limerick, Ireland, November 2000. Corkery says that 55% of sales orders are "administered" online, which means they are handled online for some part of the order management process. For some countries, orders come in by phone, fax or email and have to be keyed into the order management system.

sales offices in each country have their own sales order systems, which are to be replaced with a single common system.

Online support

Dell's general model for international online support is "globalize, then regionalize," which means to develop a global application then localize it as necessary. Most applications are developed in the U.S. and then rolled out in other regions. For instance, Premier Support is being rolled out first in the U.S., then in other parts of Americas and other markets such as Japan and Europe. The U.S. online support organization doesn't have direct control over other regions, but its managers work with the regions to develop applications and standards.

Problems that arise in providing support outside the U.S. mostly involve infrastructure, such as connecting different types of systems in different regions, and getting applications to run in different environments. The situation has improved in recent years, as different regions have standardized on the same legacy systems, such as Dell Product Services (DPS), which coordinates sales, customer service, spare parts management and other service and support functions. As Dell rolls out online support around the world, other regions sometimes have to change their support processes to accommodate its use.

Dell works with partners for service in other regions. In Asia-Pacific, Dell usually provides customer service through its partners, Getronics and Unisys. Dell uses local service companies in China. In the U.K, Dell has alliances with Aris, Axon and OS Integrations to assist business customers in designing and implementing their Internet strategies. This is managed under Dell's for the "E"xpert Services Group, which manages similar alliances with Arthur Andersen and Gen3 in the U.S.[36]

Infrastructure

Dell maintains separate Internet infrastructures in the three regions, with data centers in Ireland, Singapore and the U.S. Dell established its Asia-Pacific Web Farm in Singapore to host the content of all its online stores in the Asia-Pacific region. With this new data center, response time to the customer improved 30%, as initial monitoring has revealed, because traffic to the central Asia- Pacific Dell Web site no longer has to be routed through the U.S. Through ESMARTS (Electronic Sales Management Accounts Receivable Transaction System), an internally developed application, the Asia-Pacific Web Farm is able to link directly to the order fulfillment systems in the Dell manufacturing operations in Malaysia and China.[37]

E-commerce capabilities vary by region. For instance, Japan has 1500 Premier Pages, but does not have Ask Dudley because of the difficulty of handling over 5000 Japanese kanji (characters) in such a search engine. Japan and Asia-Pacific do not have Gigabuys, but each has a more limited selection of third party products.[38]

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[36] "Dell Enters U.K. E-Consulting Alliances with Aris, Axon and OS Integration," PR Newswire, 4/11/2000
[37] " Dell Sets Up Asia-Pacific Web Farm In Singapore*," Asia Computer Weekly* 2/28/00
[38] Interviews with Kevin Baker, Dell Online Japan and Jack Cantillon, Dell Online Asia-Pacific, 3-00

E-COMMERCE PERFORMANCE

E-commerce performance can be measured in a number of ways. Measures of web site activity, such as number of hits or number of unique visitors are often cited as indicators of online success. But what matters in terms of the bottom line are business metrics such as online sales, cost savings, customer satisfaction, and market expansion.

Online sales

Dell claims its "web enabled" revenues are $50 million per day, over half of its revenues, as of mid-2000. By contrast, IDC reports that 16.5% of Dell's sales were Internet direct in the first quarter of 2000.[39] This reflects a difference of definition, as IDC only counts transactions initiated and completed online, while Dell's definition includes orders taken online, even if payment is made offline, as is often the case. The IDC figure is still nearly twice as high as any other PC maker (Table 1). This reflects Dell's efforts to push business to the web as much as possible. It also reflects the fact that Dell does not face the channel conflicts that hamper indirect competitors such as IBM, HP, Compaq and Apple from selling more aggressively online.

Table 1. Internet direct sales as share of total PC revenues

Company	Internet as share of revenues (%)	
	1999	Q1 2000
Gateway	8.0	8.9
Dell	11.7	16.5
Apple	6.4	6.5
Compaq	1.3	2.2
HP	1.4	1.8
IBM	3.8	4.8

 Source: IDC

Cost savings

The savings achieved by having customers interact with Dell electronically instead of on the phone are significant. The cost of a support call averages $12-20 for the industry, while the cost is close to zero if the customer uses online support. Even if the customer goes online and then calls in, the customer may be able to give the technician better information for a faster and more accurate diagnosis because of the help received online.[40]

The potential benefits of online self help are seen in comparing the cost of providing different types of service and support (Table 2). Dell's goal is to push customers to the left of Table 2 as much as possible by continually making self-help more useful and easier to use. That is, the goal is to reduce the number of assisted-help incidents by greater use of automated service and

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[39] Joseph Rigoli, U.S. PC Distribution Channels, 1Q00 Analysis, IDC Bulletin #22485

[40] The actual benefits of self-help are illustrated by the fact that Dell's transaction team saved $11 million over three years just from the order tracking capabilities it put online. This was roughly enough to cover the team's entire budget.

support.[41] In addition, Dell's goal is to reduce the number of help incidents in the first place by continually improving product quality.

Table 2. Cost continuum for customer support modes

	Self help		Assisted help		
	Box: Self-help tools inside the PC	Web-based	E-mail	Phone call	On site visit
Fixed cost	Large up-front cost (mainly programming labor) to create knowledge base (50%) and software (30%) and maintain it (20%). Overall, fixed cost is about the same for call centers and web-based help, because while knowledge and software costs are less for call centers, there are larger costs for space and hardware.				
Marginal cost	Close to zero $0.10-0.15	Close to zero $0.10-0.15	Industry average=$3-5	Ind avg. = $12-20	Ind. avg. = $80-120

Source: Interviews with Dell managers

Dell expects both itself and the customer to benefit from online support, by saving money and improving the quality of service. One Dell manager estimates that about 70% of the benefits go to the customer and about 30% to Dell. Of course in the long run, this should translate into customer satisfaction and loyalty to Dell products.

It is clear that the cost of providing online support is lower than phone support. The cost of call center support is about $20 per call, while web support is about $2 per visit. This includes costs involved in developing and maintaining the support site.[42]

Dell believes that the number of service dispatches decreases as web support is used more often. For instance, by having Dell handle calls, Boeing's dispatch rate (% of calls that required an onsite visit) dropped from about 70% to about 30%, saving Boeing a substantial amount of money. Some of this is due to the skill of Dell's technicians in resolving problems on the phone, but some is also likely due to the availability of online support tools. One thing is clear: in order for both Dell and the customer to get the full benefits of online support, customers have to become used to helping themselves online rather than calling.

Similarly, the cost of an Internet sales transaction is much lower than a phone transaction, and may even result in greater customer satisfaction if the online experience is good. For instance,

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[41] So far, Dell has not come up with a way to measure these variables directly. Others have used assumptions, such as the Association of Software Providers who assume that five web visits eliminate one phone call, but there's no way to confirm that. Developing such measurements is one of the tasks for the online support groups. For a first step, they have put brief surveys on the support site; for instance, when customers open a technical document, they are asked, "Did this help solve your problem?"

[42] The cost of providing online service and support includes hardware and labor. For transaction customers, of the total non-hardware costs, 30-35% is for new software, 15%-20% for software maintenance and upgrading, and 50% for knowledge management, which includes updating the site and databases with new drivers, information, and tutorials. Dell could not provide exact data on the cost of developing and maintaining online support applications for relationship customers. A rough estimate of the total cost breakdown is as follows: 60-80% for software development, including personnel; 20% for hardware; 20% for content. Most of the content is provided by technical professionals as part of their regular jobs, so their time is not included in these costs. These technical people are given incentives to add content to the site.

the customer can use the configurator and try out many configurations without feeling uncomfortable about taking up a sales person's time. Even if the final sale is handled over the phone, Dell saves money by having the customer go through the configuration process online and being ready (or nearly ready) to order when the phone call is made.

Customer satisfaction

Normally cost savings and customer satisfaction are thought of as separate issues, but they can both be achieved with well-designed e-commerce services. Dell feels it not only saves money with the Internet, but actually satisfies its customers better than if it only dealt with them on the telephone or in person.

Many of Dell's business customers see Dell Premier.com as a valuable management tool, helping purchasing offices and IT departments control purchasing decisions and enforce technology standards. Some customers have integrated the Dell Premier.com with their own systems to allow electronic purchasing, cutting processing time and making ordering easier. Also, both financial and IT departments benefit from Dell's ability to provide them with a history of their purchases from Dell. All of these benefits increase customer satisfaction among Dell's core customer group of large corporations, primarily with their IT departments, but also in other areas such as procurement and finance.

While it is difficult to relate customer loyalty and repeat sales directly to the Internet and e-commerce, there is strong evidence that the Dell Premier.com services are a factor in helping Dell gain repeat business and achieve sole supplier status with some large customers. Some of this is from the convenience provided by Premier services and some from customer lock-in created by the electronic linkage of business processes between Dell and its customers.[43]

Dell's web site is given high marks by users as well. A survey of *PC Magazine* readers gave Dell an "A" rating for the quality of its web site. This compared with Gateway and IBM, which received a "B" and Compaq which got a "C".[44]

Expanding market opportunities

Dell had long focused on the commercial market and made little effort to court consumers, who were seen as price conscious customers with little loyalty and who were expensive to support. This has changed somewhat with the Internet, which gives Dell a relatively low cost channel to

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[43] It was mentioned earlier that Dell often sets up Premier Pages for prospective customers which demonstrate the kind of capabilities they will enjoy if they select Dell as their supplier, and that this influences the initial purchase decision. Interviews also indicate that the Premier Pages are a factor in Dell's gaining a proportionately larger downstream share of initially split sales, and becoming the de facto sole supplier. The UK Revenue Department was cited as a recent example of this occurring, but delivery performance was also cited as the more critical factor. Sean Corkery felt that Premier Pages was helpful to put up the order and provided useful information for the customer, but procurement decisions come down to fundamentals of speed, quality and cost. Another Dell manager, Maurice Cowey felt that "Premier Pages were a swing factor in retention and renewal and additional selling." Interview with Sean Corkery, General Manager EMF3, Dell Computer, November 2000, and Maurice Cowey, Vice President, Preferred Accounts Division, Dell EMEA, December 2000.

[44] Ben Z. Gottesman, "Computer Hardware and Software," PC Magazine, November 1, 1999. http://www.zdnet.com/pcmag/stories/reviews/0,6755,2354137,00.html

reach individual consumers and to provide them with front line service and support. In fact, Dell's online business first targeted catalog customers, who were mainly consumers and small businesses, and only later began to focus on relationship customers.

Dell initially saw the Internet as a means for expanding globally without investing in a large direct sales force such as it uses in the U.S. While Dell originally used resellers in many international markets, and employed a centralized sales approach in Europe, Dell is finding that it must also invest in a large direct sales force (around one-half its total) for success in Europe. Dell is reportedly employing the direct online model in emerging markets such as Brazil and China, and mainly with subsidiaries of companies that are already customers.

COMPANY PERFORMANCE

Dell's performance since its inception has been excellent by any measure, but the company went on a truly extraordinary run from 1995-1998, a period in which it achieved annual growth rates of 50% in revenues and 75% in profits. During this time, it became the number two PC seller in the U.S. and number three worldwide, and saw its stock price rise by a compound rate of 287% annually. This run coincided with the company's full scale embrace of the Internet throughout its operations.

Dell's performance slowed significantly in 1999, although it still achieved growth rates that most companies would envy. Sales grew 38% and net income rose 27%, as gross margins were squeezed and revenues per employee fell (Table 3).

**Table 3. Revenues, profits, employees, 1990-1999.**

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Revenue	546	889	2013	2873	3475.3	5296	7759	12327	18243	25265
Net Income	27	50	101	-35	149	272	518	944	1460	1860
Net Profit Margin	4.99%	5.72%	5.05%	-1.25%	4.29%	5.14%	6.68%	7.66%	8.00%	7.4
Employees	2050	2970	4650	5980	6400	8400	10350	16000	24400	36500
Rev/Emp ($000)	266.5	299.6	433.1	480.5	543.0	630.5	749.7	770.4	747.7	692.2

Note: Dell's fiscal year ends in January. Figures for 1999 are called FY 2000 by Dell.

Dell passed Compaq to claim the number one position in the U.S. market, while passing IBM to become number two worldwide (Figures 4 and 5). Dell's slowdown in 1999 continued in 2000, thanks in part to ever tighter price competition in the PC industry and a slump in U.S. PC demand. This has been offset somewhat by the fact that Dell's product mix has shifted toward higher margin notebook PCs and servers, but overall, average selling prices have still fallen.   In February 2001, Dell announced that it was looking to cut operating costs, and analysts expected that effort to include layoffs.[45]
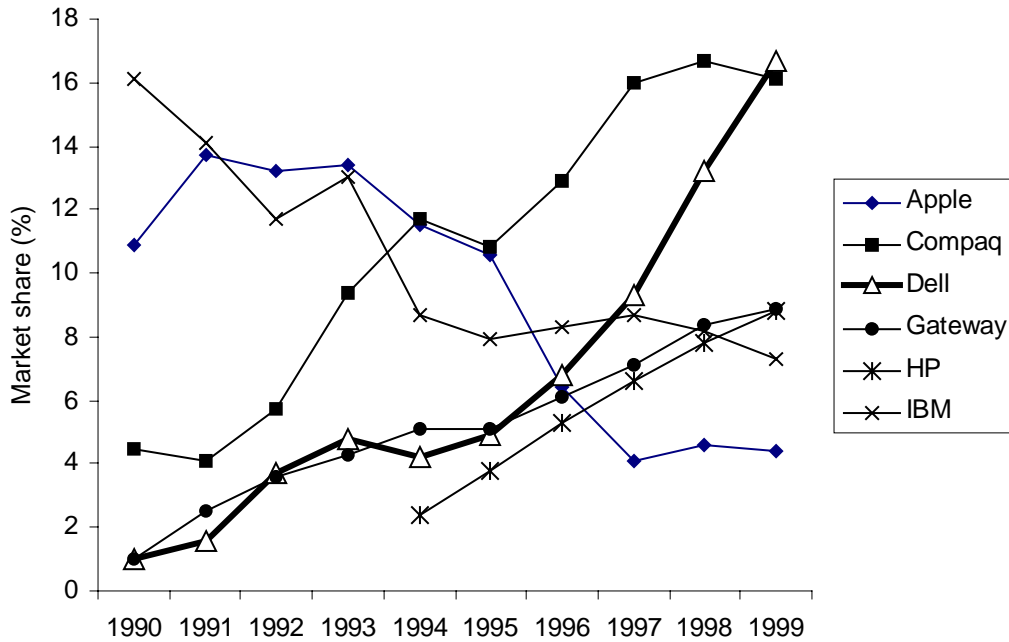
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[45] Ian Fried and Richard Shim, "Dell shares tumble as company cuts costs," CNET News.com, February 9, 2001

Figure 4. Worldwide PC market share, 1990-1999
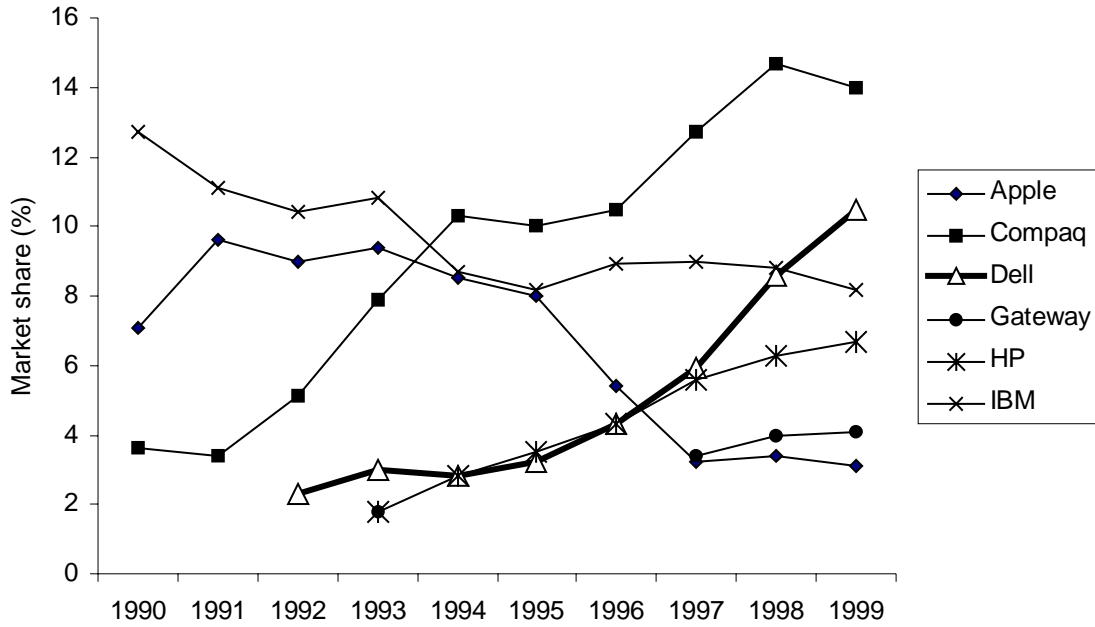
Source: IDC

Figure 5. U.S. PC market share, 1990-1999

Source: IDC

Linking Dell's performance to e-commerce

It is not easy to link Dell's use of the Internet and e-commerce directly to its financial performance, which is influenced by a wide range of factors. However, there is evidence of a statistically significant relationship between operational performance indicators (such as inventory turnover and customer satisfaction) and sales and profit performance in the PC industry (Smith, 2000). Thus, if linkages can be found between e-commerce and operational performance, these would imply a connection to overall company performance.

If the Internet has had an important impact on Dell's operations, we would expect to find it in areas such as inventory management, overhead costs, cash conversion, and customer service. Looking at these measures, we do find major differences between Dell and the other leading PC makers, and within Dell since it introduced online services.

Performance relative to other PC makers

Dell has consistently outperformed other PC makers and the PC industry as a whole on most financial measures (Table 5). In 1999, its return on equity and return on assets were first in the industry, its net profit margin was second to Apple, and its overhead (SG&A) costs were by far the lowest in the industry. Dell's operating performance was equally impressive, with high rates of inventory and asset turnover reflecting the inherent advantages of the direct model and the efficiencies Dell has achieved with that model. Dell also has doubled the industry average for revenue growth over the previous 12 months and 36 months.

Table 4. Performance comparison of leading PC makers, 1999

	Gateway	Dell	Apple	Compaq*	PC Industry
Profitability					
Gross profit margin	22.0	20.7	28.0	22.7	23.9
SG&A as % of revenues	15.1	9.4	16.0	16.5	N/A
R&D as % of revenues	<1	1.5	5.0	4.3	N/A
Operating income as % of revenue	6.9	9.0	5.8	1.6	N/A
Net profit margin	5.2	6.6	9.7	1.4	4.1
Return on equity	23.0	31.4	17.1	4.1	12.7
Return on assets	11.7	14.5	9.6	2.2	6.7
Operating Ratios					
Inventory turnover	36.8	59.9	243.2	14.2	24.2
Asset turnover	2.5	2.8	1.2	1.5	1.9
Growth rates					
12-month revenue growth	13.2	38.5	15.9	10.7	19.9
12-month net income growth	25.5	14.1	47.8	n/m	n/m
36-month revenue growth	16.0	48.2	-4.6	23.9	21.8
36-month net income growth	32.7	47.2	n/m	n/m	n/m

* Compaq data includes former DEC and Tandem businesses, and so is not directly comparable to pure PC makers.
N/A: not available
n/m: not measurable
Sources: Hoovers Online and company annual reports and 10-K reports

Performance since the introduction of Internet and e-commerce

Dell has also shown major improvements since 1995 in leading operational measures such as inventory turnover, cash conversion, and SG&A as a percent of revenues (Table 5).

Table 5. Dell's performance over time

	1995	1996	1997	1998	1999
Days inventory on hand	31	13	7	6	6
SG&A as % of revenues	11.30	10.70	9.80	9.80	9.40
Cash conversion cycle	40	-4	-8	-12	-18

Again, it is difficult to attribute these performance gains *only* to the Internet and e-commerce, as Dell has continued to upgrade its operations in many ways (for instance, new manufacturing processes were introduced in 1997 at Dell's Metric 12 plant in Austin, and implemented in other plants around the world). Dell's business model also has some inherent advantages, but it was using the direct model in 1995 with much poorer results. It is possible that the benefits of the direct model could have been realized if Dell had not so fully embraced the Internet and e-commerce to improve its own processes and to coordinate the virtual company it has created. But, there is strong evidence that these technologies were critical to fully achieving the efficiencies and tapping the capabilities of Dell's business model.

While the foregoing case for e-commerce boosting Dell's performance is fairly strong, a counter argument about the value of e-commerce to Dell might be indicated by the company's modest performance in the past year and a half. In a period when its earlier and ongoing investments in the Internet and e-commerce should be paying big dividends, Dell's growth has slowed, its profit margins have thinned, and its stock price has dropped by over 50% from its peak.

While Dell's problems in 1999 were attributed to shortages and higher prices for some components, the company has often stated that its long-term relationships with key suppliers would provide a buffer from such fluctuations. Also, the company argued that its close electronic integration with customers and suppliers would make its entire value chain more responsive than those of its competitors. Yet when demand slowed in 2000, Dell was apparently caught off guard, as was the rest of the PC industry.

It would be too pessimistic to conclude that a slowdown from Dell's extraordinary growth rate is evidence that its investments in e-commerce are not paying off. A longer term view that looks at the 1995-2000 period suggests that the company is indeed benefiting from its pioneering use of the Internet as a business tool. The benefits of e-commerce include closer customer integration, higher customer satisfaction, supply chain efficiency, and lower costs for selling and supporting PCs and related products. Another clear benefit is the ability to extend the Dell brand to non-PC products and services, particularly for the Internet market, using Dell's reputation as an e-commerce leader as a selling point.

If Dell faces a more difficult future, it is more likely because of its heavy emphasis on selling PC hardware, which continues to become more of a price-driven commodity. Dell's future may depend on how well it can apply its virtual company model in the Internet services market, as it

is now trying to do with its various web services initiatives. Coordinating a virtual company to provide e-commerce solutions is a fundamentally different challenge than coordinating a supply and support network for standardized hardware. Dell's mastery of the Internet should be an important asset in doing so, but as the scale and scope of its virtual company expands, the difficulties in managing it will become more complex and expensive.

CONCLUSION: IT, E-COMMERCE, AND THE VIRTUAL CORPORATION

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 manufactured 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.

- 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.

- 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.

- 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. Control is achieved by Dell being at the center of all information and communications with the customer as shown in Figures 3 and 4 and elaborated above. 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' business 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.

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