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Dell Inc.'s Production System

Changing Place in the Industry

In 1984 Michael Dell, a freshman at the University of Texas, started a computer business (called PCs Limited) out of his dorm room.[1] This company sold IBM PCs through mail-order.[2] His goal was to cut out the middleman, enabling the customer to get exactly what he or she wanted while removing the middleman's markup.[3] He had a successful start, selling $80,000 worth of computers by the end of his freshman year.[4]

By late 1986, his company (eventually to be named Dell Inc.) had 250 employees and shipped about 4,000 computers per month.[5] From the beginning, the company assembled its machines in the United States in its own plants and took orders from customers directly instead of through stores or a dealer network.[6]

By 1995, Dell, headquartered in Austin, Texas, ranked among the world's five largest computer companies, sold its computers in more than 125 countries, and employed approximately 6,400 people.[7]

Dell took its direct selling to the Web (and www.dell.com) in 1996; by April 1998 Dell was selling $5 million per day through the Web site.[8]

By 1998, Dell had three manufacturing facilities – in Austin, Ireland, and Malaysia – sold computers to customers in over 170 countries, and employed around 16,000 people.[9] Dell's success was widely attributed to its process of selling custom-built computers directly to customers.

Dell's business model continued to be wildly successful through the mid-2000s. In 2005, the company was first in both US (33.5%) and global (18.2%) market share. (See **Figure 1**.[10]) Its product line was primarily "desktop computers, notebook computers, network servers, workstations, and storage products."[11] Since 2005, the firm's market share has fallen.

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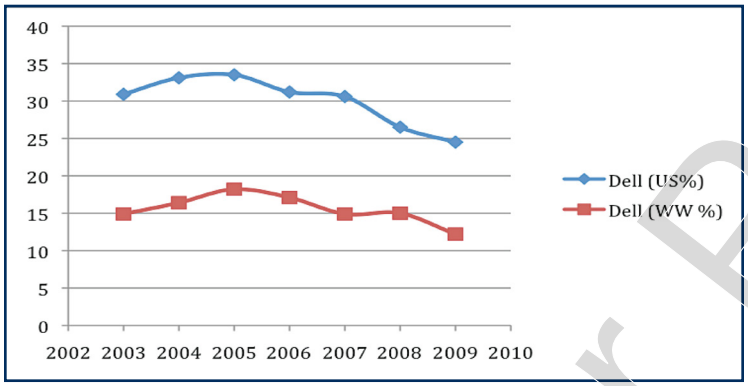
Figure 1



The Original Supply Chain Concept

Dell's original business plan was direct sales of customizable PCs with superior post-sales service. This direct sales process was fairly straightforward: After a customer placed an order, either by phone or through the Internet (on www.dell.com), Dell processed the order through financial evaluation (credit checking) and configuration evaluations (checking the feasibility of a specific technical configuration), which took two to three days, after which it sent the order to one of its manufacturing plants.[12] The benefit of the customization was that it allowed the customer to invest in the components that he or she wanted to optimize, while minimizing costs on the rest.[13]

The two major operational goals under this model were to reduce inventory and reduce the amount of time between taking ownership of parts from a supplier and shipping the completed PC to the customer.[14] Holding on to inventory was an expensive proposition. First, simply having excess parts lying around meant the assembler had to build space in the plant to store all of them. Second, because of the pace of change of technology, "[m]any components lose 0.5 to 2.0 percent of their value per week, and a supply chain packed with yesterday's technology is nearly worthless."[15]

Dell succeeded at reducing inventory to a remarkable degree. In 1996, "Dell carried 20 to 25 days of inventory in a sprawling network of warehouses. [In 2007] it has no warehouses. And though it assembles nearly 80,000 computers every 24 hours, it carries no more than two hours of inventory in its factories and a maximum of just 72 hours across its entire operation."[16]

While Dell had success with the build-to-order model, most other companies were simply building a few different configurations that they sold through stores, the Web, or call centers. The build-to-order model was difficult to imitate because Dell had designed all parts of the organization to support the execution of it.

"At Dell, supply chain management is truly viewed as a strategic capability; it drives coordination with, and in many instances it includes, activities such as marketing, sales, finance, and information technology."[17]

Strategies to Support the Business Model

Four intertwined organizational competencies supported Dell's model: demand management, internal collaboration, leveraging partners, and financial fundamentals.[18]

Demand management

Deep and direct knowledge of customers helped Dell adapt its manufacturing schedule quickly when conditions changed.[19] Dell's culture, which emphasized flexibility and speed, was particularly appropriate in volatile markets.[20] Dell used a technique called "demand shaping" to adjust promotions so as to curtail sales of products containing parts that were running low.[21] This knowledge was also shared electronically with suppliers to help them adapt their manufacturing schedules and reduce costs. Dell's philosophy was that cost savings anywhere in the supply chain could eventually be passed on to the consumer, increasing the attractiveness of Dell's offerings.[22]

Internal collaboration

Dell emphasized sharing information — about parts, inventories, and flows — throughout the organization.[23] Information was shared up and down the organization, irrespective of hierarchies and reporting structures.[24]

Leverage business partners

Dell also shared information — such as supply and demand trends — with suppliers through IT links.[25] This "extranet," called ValuChain, was used to share information on inventory levels, usage forecasts, quality information, and part flows.[26] The information was extremely important to suppliers because most were located in Southeast Asia, from where it took seven to thirty days for goods to be transported to Austin.[27]

Suppliers also sent information back to Dell about their production schedules.[28] To ensure a reliable flow of parts, suppliers built logistics facilities next to Dell factories.[29] The inventory that suppliers held helped to buffer against changes in demand.[30] Dell drew parts from these facilities every few hours.[31]

Dell also trained suppliers on ways to improve their manufacturing and logistics processes.[32] By 2007 Dell had achieved such efficiencies with its design and processes that certain Dell computers could be pieced together in three minutes.[33] Even including all software loading and quality testing, the entire assembly process took four to eight hours.[34]

Dell relied on suppliers to invest in the research and development that was necessary to come up with each new generation of technology.[35] Dell was quite clear that it wanted suppliers to perform up to expectations, and it raised those expectations frequently. "It rates all of its vendors on their ability to compete on cost, technology, supply predictability, and service, and posts their scores daily on a password-protected Web site."[36]

Financial fundamentals

Dell management focused relentlessly on tracking performance measures for products, factories, and assembly lines. Dell managers looked at operating margin first, but also paid attention to the balance sheet (minimizing assets and liabilities), income statement, and cash levels.[37]

Other important measures were days of inventory, days of receivables, days payable, selling price vs. rivals, and overhead costs from selling (such as Web site maintenance and post-sales service of its products).[38]

The speed of the system meant that Dell's suppliers were essentially financing its operations. Dell paid suppliers an average of 36 days after it received payment from its customers; this compared to the industry practice where companies typically paid suppliers 30 days before the PC was shipped to a customer.[39]

Changing Technology Forced a Change in Strategy

Three trends in the mid-2000s affected Dell's performance.

1. The price of almost every component in a PC dropped significantly[40] – everything from monitors, to processors, to memory chips, to storage devices.
2. The cost difference between the highest and lowest performing components also declined, which made it difficult for Dell to differentiate itself based on computer performance.
3. Finally, customers appeared to be putting more emphasis on service. Anything that complicated the buying process or made the service process difficult drove customers away.[41]

All three trends adversely affected Dell.

Dell in 2008

By early 2008, it was clear that Dell's way of doing things, the way that it had operated for over twenty years, was no longer appropriate. Certainly, the finance markets had passed judgment. Dell's market capitalization dropped from $100 billion in 2005 to $30 billion in 2009.[42] Dell's north Austin assembly plant, world famous for its efficiency, was the only such plant for any manufacturer in the United States.[43] All of its competitors manufactured their computers overseas where the work could be done less expensively.

In April 2008,

> Dell executives outlined plans to move some business to a prebuilt model, where PCs are preconfigured and shipped to customers without the same options for customizing that has long been the company's main selling point. To do that, Dell will also begin to rely more heavily on outside manufacturers and other partners to build its products and get them in the hands of customers."[44]

The reason for this was to enable Dell to build less expensive computers that met the needs of more customers. Dell's old way of designing and assembling a computer demanded that the basic configuration of the computer be sophisticated enough to handle many different options that might be included. Mike Cannon, president of global operations for Dell, said that a "typical desktop program for Dell can have over half a million different configurations. Why did we do that? Because we could. But now, if customers don't need that, we've got to go rip that cost out."[45]

Dell planned to maintain some customizable systems but appeared to be moving the bulk of its business to limited configuration systems.

Dell would now have to learn how to focus on the customer instead of the supply chain. HP was taking customers from Dell with its attractive notebook designs.[46] Dell needed to fight back with something different. It began to take steps to design products that had a sense of style and not just utility. It increased its investments in research and development so that it might be able to differentiate its products from those of its competitors.[47] It also started selling its computers in retail shops such as Best Buy and Wal-Mart.[48]

In late 2008, Dell closed its north Austin assembly plant, and in late 2009 it announced it was closing another major plant in North Carolina. Much of the work these plants formerly did would be moving to Mexico and Asia.[49]

Endnotes

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[9] Dell Computer Corporation Annual Report 1998: p. 2.

[10] Various IDG and Gartner press reports between 2003 and 2010.

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[12] Kapuscinski et al., p. 192.

[13] Lappin.

[14] Fugate, Brian S., and John T. Mentzer. "Dell's supply chain DNA." Supply Chain Management Review October 2004: 20.

[15] Kapuscinski et al., p. 191.

[16] Breen, Bill. "Living in Dell time." Fast Company 19 Dec. 2007. http://www.fastcompany.com/magazine/88/dell.html.

[17] Fugate and Mentzer, p. 24.

[18] Fugate and Mentzer, p. 21.

[19] Fugate and Mentzer, p. 21

[20] Fugate and Mentzer, p. 22.

[21] Breen.

[22] Fugate and Mentzer, p. 21.

[23] Fugate and Mentzer, p. 22.

[24] Fugate and Mentzer, p. 22.

[25] Fugate and Mentzer, p. 22.

[26] Kapuscinski et al., p. 193.

[27] Kapuscinski et al., p. 192.

[28] Fugate and Mentzer, p. 23.

[29] Fugate and Mentzer, p. 23.

[30] Kapuscinski et al., p. 192.

[31] Kapuscinski et al., p. 192.

[32] Fugate and Mentzer, p. 23.

[33] Breen.

[34] Breen.

[35] Kapuscinski et al., p. 191.

[36] Breen.

[37] Fugate and Mentzer, p. 23.

[38] Fugate and Mentzer, pp. 23-4.

[39] Breen.

[40] Lappin.

[41] Lappin.

[42] Edwards, Cliff. "Dell's extreme makeover." BusinessWeek 15 Oct. 2009. http://www.businessweek.com/print/magazine/content/09_43/b4152036025436.htm downloaded 16 Jan. 2010.

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[45] Gallagher.

[46] Edwards.

[47] "Dell: Then and now." BusinessWeek 15 Oct. 2009. http://www.businessweek.com/magazine/content/09_43/b4152036030179.htm downloaded 16 Jan. 2010.

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Notes

Established at the University of Michigan in 1992, the **William Davidson Institute** (WDI) is an independent, non-profit research and educational organization focused on providing private-sector solutions in emerging markets. Through a unique structure that integrates research, field-based collaborations, education/training, publishing, and University of Michigan student opportunities, WDI creates long-term value for academic institutions, partner organizations, and donor agencies active in emerging markets. WDI also provides a forum for academics, policy makers, business leaders, and development experts to enhance their understanding of these economies. WDI is one of the few institutions of higher learning in the United States that is fully dedicated to understanding, testing, and implementing actionable, private-sector business models addressing the challenges and opportunities in emerging markets.