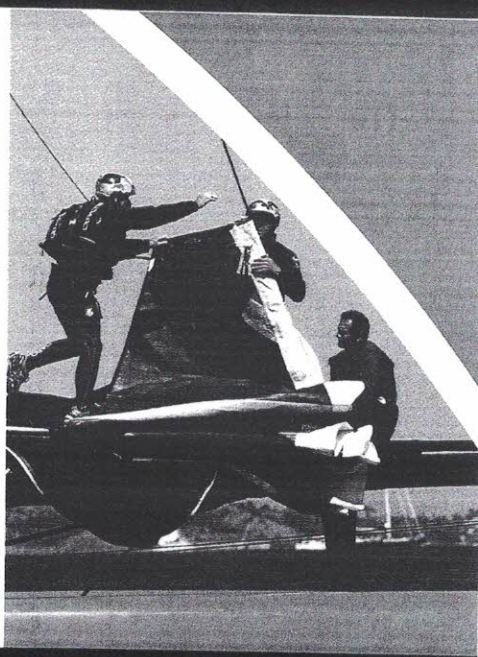
CHAPTER 4

COMPETITIVE ADVANTAGE THROUGH FUNCTIONAL-LEVEL STRATEGIES



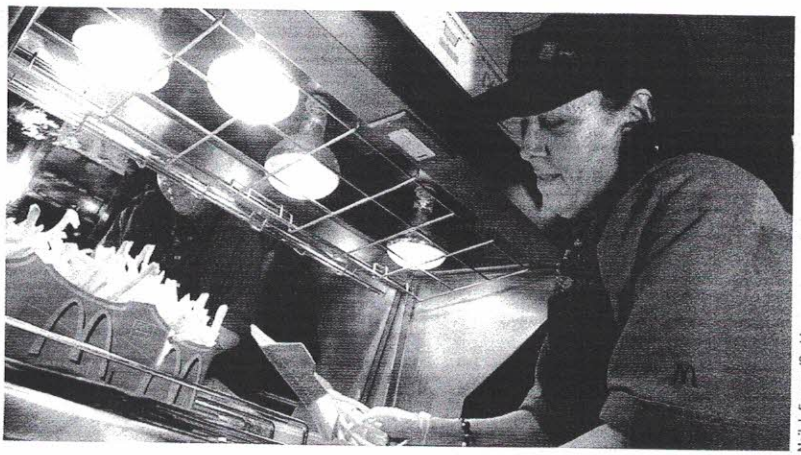
Christopher Halloran/Shutterstock.com

OPENING CASE

Trouble at McDonald's

For most of its history McDonald's has been an extraordinarily successful enterprise. It began in 1955, when the legendary Ray Kroc decided to franchise the McDonald brothers' fast-food concept. Since its inception, McDonald's has grown into the largest restaurant chain in the world, with almost 32,000 stores in 120 countries.

For decades, McDonald's success was grounded in a simple formula: give consumers value for money, good quick service, and consistent quality in a clean environment, and they will return time and time again. To deliver value for money and consistent quality, McDonalds standardized the process of order taking, making food, and providing service. Standardized processes raised employee productivity while ensuring that customers had the same experience in all branches of the restaurant. McDonald's also developed close ties with wholesalers and food producers, managing its supply chain to reduce costs. As it became



Najlah Feanny/Corbis

LEARNING OBJECTIVES

4.1 Explain how an enterprise can use functional-level strategies to increase its efficiency

4.2 Explain how an enterprise can use functional-level strategies to increase its quality

4.3 Explain how an enterprise can use functional-level strategies to increase its innovation

4.4 Explain how an enterprise can use functional-level strategies to increase its customer responsiveness

larger, buying power enabled McDonald's to realize economies of scale in purchasing and pass on cost savings to customers in the form of low-priced meals, which drove increased demand. There was also the ubiquity of McDonald's; their restaurants could be found everywhere. This accessibility, coupled with the consistent experience and low prices, built brand loyalty.

The formula worked well until the early 2000s. By then, McDonald's was under attack for contributing to obesity. Its low-priced, high-fat foods were dangerous, claimed critics. By 2002, sales were stagnating and profits were falling. It seemed that McDonald's had lost its edge. The company responded with a number of steps. It scrapped its supersize menu and added healthier options such as salads and apple slices. Executives mined data to discover that people were eating more chicken and less beef. So McDonald's added grilled chicken sandwiches, chicken wraps, Southern-style chicken sandwiches, and most recently, chicken for breakfast to their menu. Chicken sales doubled at McDonald's between 2002 and 2008, and the company now buys more chicken than beef.

McDonald's also shifted its emphasis on beverages. For decades, drinks were an afterthought, but executives couldn't help but note the rapid growth of Starbucks. In 2006, McDonald's decided to offer better coffee, including lattes. McDonald's improved the quality of its coffee by purchasing high-quality beans, using better equipment, and filtering its water. The company did not lose sight of the need to keep costs low and service quick, however, and continues to add coffee-making machines that produce lattes and cappuccinos in 45 seconds, at the push of a button. Starbucks it is not, but for many people a latte from the McDonald's drive-through window is comparable. Today, the latte machines have been installed in almost half of the stores in the United States.

All of these strategies seemed to work. Revenues, net profits and profitability all improved between 2002 and 2013. By 2014, however, McDonald's was once more running into headwinds. Same-store sales declined in 2014, impacting profitability. Among the problems that analysts identified at McDonald's was an inability to attract customers in the 19- to 30-year-old age group. Rivals offering healthier alternatives, such as Chipotle Mexican Grill, and "better burger" chains that appeal to this demographic, such as Smashburger, are gaining ground at the expense of McDonald's. A recent *Consumer Reports* survey ranked McDonald's burgers the worst among its peers. Another problem is that the quality of customer service at McDonald's seems to have slipped. Many customers say that employees at McDonalds are rude and unprofessional. One reason why McDonald's employees might be feeling stressed out is that the menu has grown quite large in recent years, and many restaurants are not longer staffed given the diversity of the menu. Management at McDonalds has promised to fix these problems, but how they will do this remains to be seen.

Sources: Jonathan Beer, "5 Reasons McDonald's Has Indigestion," *CBS Money Watch*, August 12, 2014; A. Martin, "McDonald's, the Happiest Meal is Hot Profits," *New York Times*, January 11, 2009; M. Vella, "A New Look for McDonald's," *Business Week Online*, December 4, 2008; M. Warner, "Salads or No, Cheap Burgers Revive McDonald's," *New York Times*, April 19, 2006.

OVERVIEW

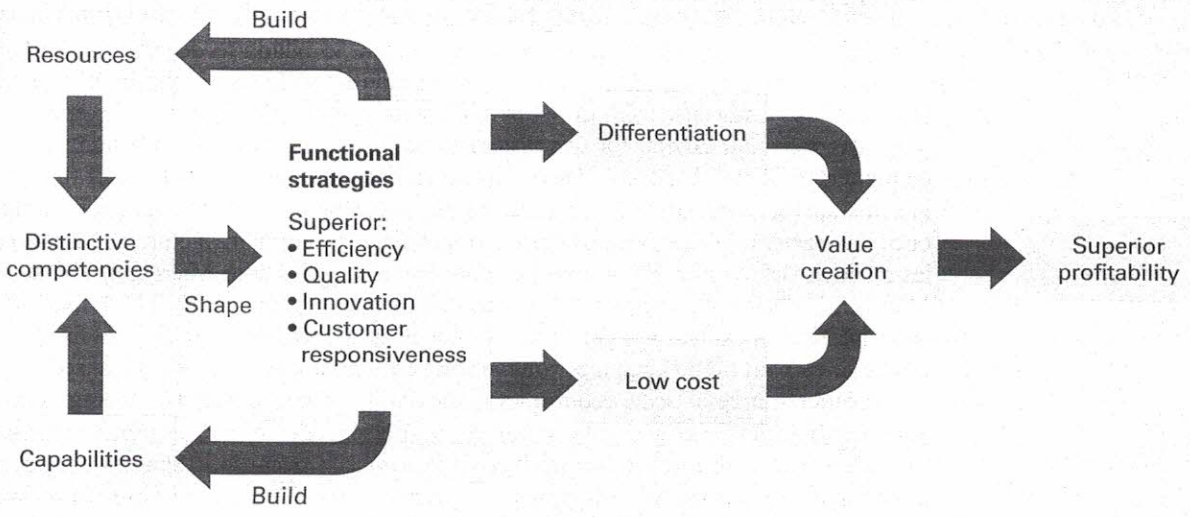
In Chapter 3, we saw how valuable, rare, inimitable resources that are well organized within an enterprise form the foundation of competitive advantage. These resources reside in the value creation activities (functions) of a company. In this chapter, we take a close look at how a firm can use functional-level strategies to build valuable resources that enable it to attain superior efficiency, quality, innovation, and customer responsiveness (see Figure 4.1). **Functional-level strategies** are actions that managers take to improve the efficiency and effectiveness of one or more of value creation activities (see Figure 3.5 in the previous chapter).

functional-level strategies
Actions that managers take to improve the efficiency and effectiveness of one or more value creation activities.

The Opening Case illustrates some of these relationships. Historically, McDonald's has been a standout performer in the fast-food industry. McDonald's was a fast-food *innovator*, developing many of the practices that have become standard in the industry. It was *responsive to customer needs* for inexpensive fast food, good, quick service, and a clean environment. By standardizing the process of making fast food and working closely with its suppliers, McDonald's improved its *efficiency*, thereby lowering costs and prices, while offering a product of *reliable quality* that was the same no matter where it was purchased.

However, by the early 2000s, the company's distinctive competence in providing inexpensive fast food of reliable quality was under attack. Eating habits were changing. McDonald's responded to shifting customer needs by changing its menu, and for a few years this seemed to work. By 2014, however, same-store sales and profits were once more declining. This time, the problem was not only McDonald's menu but also a perception that the quality of customer service had declined. To fix these problems, McDonald's will have to take many actions at the functional level to enhance the perceived quality of its product offering, reconfigure the menu, and improve in-store customer service, all while keeping costs under control through efficient operations.

Figure 4.1 The Roots of Competitive Advantage



McDonald's, in other words, needs to adjust many of its functional strategies. The content in this chapter is germane to the problems McDonald's is facing today, for much of it is devoted to looking at the basic strategies that can be adopted at the functional level to improve efficiency, quality, innovation, and customer responsiveness of the enterprise. By the end of this chapter, you will understand how functional-level strategies can be used to build a sustainable competitive advantage.

ACHIEVING SUPERIOR EFFICIENCY

A company is a device for transforming inputs (labor, land, capital, management, and technological knowhow) into outputs (the goods and services produced). The simplest measure of efficiency is the quantity of inputs that it takes to produce a given output; that is, efficiency = outputs/inputs. The more efficient a company, the fewer the inputs required to produce a given output, and therefore the lower its cost structure. Put another way, an efficient company has higher productivity and therefore lower costs than its rivals. Here we review the steps that companies can take at the functional level to increase efficiency and lower cost structure.

Efficiency and Economies of Scale

economies of scale
Reductions in unit costs attributed to larger output.

Economies of scale are unit cost reductions associated with large-scale output. You will recall from the Chapter 3 that it is very important for managers to understand how the cost structure of their enterprise varies with output, because this understanding should help to drive strategy. For example, if unit costs fall significantly as output is expanded—that is, if there are significant economies of scale—a company may benefit by keeping prices down and increasing volume.

fixed costs
Costs that must be incurred to produce a product regardless of level of output.

One source of economies of scale is the ability to spread fixed costs over a large production volume. **Fixed costs** are costs that must be incurred to produce a product regardless of the level of output; examples are the costs of purchasing machinery, setting up machinery for individual production runs, building facilities, advertising, and research and development (R&D). For example, Microsoft spent approximately $5 billion to develop its Windows operating system, Windows 8. It can realize substantial scale economies by distributing the fixed costs associated with developing the new operating system over the enormous unit sales volume it expects for this system (over 90% of the world's 1.6 billion personal computers (PCs) use Windows). These scale economies are significant because of the trivial incremental (or marginal) cost of producing additional copies of Windows 8. For example, once the master copy has been produced, original equipment manufacturers (OEMs) can install copies of Windows 8 on new PCs for zero marginal cost to Microsoft. The key to Microsoft's efficiency and profitability (and that of other companies with high fixed costs and trivial incremental or marginal costs) is to increase sales rapidly enough that fixed costs can be spread out over a large unit volume and substantial scale economies realized.

Another source of scale economies is the ability of companies producing in large volumes to achieve a greater division of labor and specialization. Specialization is said to have a favorable impact on productivity, primarily because it enables employees to become very skilled at performing a particular task. The classic example of such economies is Ford's Model T automobile. The Model T Ford, introduced in 1923, was

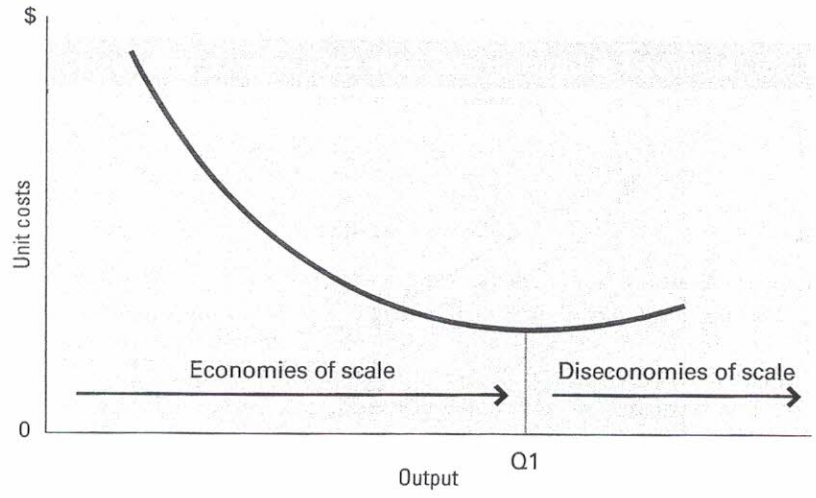
the world's first mass-produced car. Until 1923, Ford had made cars using an expensive, hand-built, craft production method. Introducing mass-production techniques allowed the company to achieve greater division of labor (it split assembly into small, repeatable tasks) and specialization, which boosted employee productivity. Ford was also able to distribute the fixed costs of developing a car and setting up production machinery over a large volume of output. As a result of these economies, the cost of manufacturing a car at Ford fell from $3,000 to less than $900 (in 1958 dollars).

The concept of scale economies is depicted in Figure 4.2, which illustrates that, as a company increases its output, unit costs decrease. This process comes to an end at an output of Q1, where all scale economies are exhausted. Indeed, at outputs of greater than Q1, the company may encounter **diseconomies of scale**, which are the unit cost increases associated with a large scale of output. Diseconomies of scale occur primarily because of the increased bureaucracy associated with large-scale enterprises and the managerial inefficiencies that can result.[1] Larger enterprises have a tendency to develop extensive managerial hierarchies in which dysfunctional political behavior is commonplace. Information about operating matters can accidentally and/or deliberately be distorted by the number of managerial layers through which the information must travel to reach top decision makers. The result is poor decision making. Therefore, past a specific point—such as Q1 in Figure 4.2—inefficiencies that result from such developments outweigh any additional gains from economies of scale. As output expands, unit costs begin to rise.

diseconomies of scale
Unit cost increases associated with a large scale of output.

Managers must know the extent of economies of scale, and where diseconomies of scale begin to occur. At Nucor Steel, for example, the realization that diseconomies of scale exist has led to the company's decision to build plants that employ only 300 individuals or less. The belief is that it is more efficient to build two plants, each employing 300 people, than one plant employing 600 people. Although the larger plant may theoretically make it possible to reap greater scale economies, Nucor's management believes that larger plants would suffer from the diseconomies of scale associated with large organizational units.

Figure 4.2 Economies and Diseconomies of Scale



Efficiency and Learning Effects

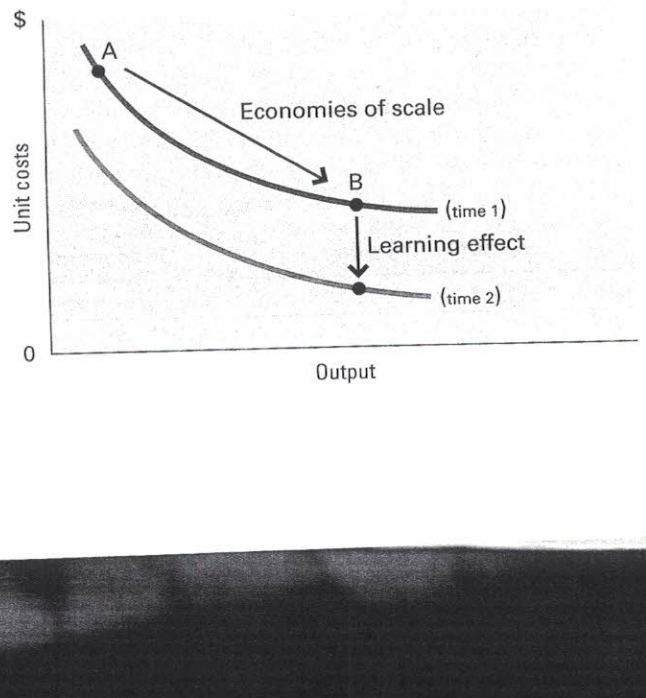
learning effects
Cost savings that come from learning by doing.

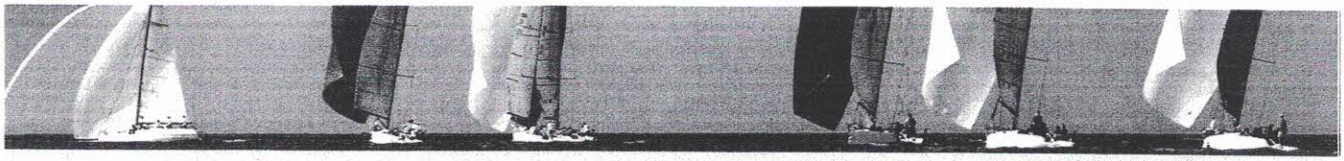
Learning effects are cost savings that result from "learning by doing." Labor, for example, learns by repetition how to best carry out a task. Therefore, labor productivity increases over time, and unit costs decrease as individuals learn the most efficient way to perform a particular task. Equally important, management in a new manufacturing facility typically learns over time how best to run the new operation. Hence, production costs decline because of increasing labor productivity and management efficiency. Put differently, over time, management and labor accumulate valuable process knowledge that leads to higher productivity. Japanese companies such as Toyota are noted for making the accumulation of process knowledge central to their operating philosophy.

Learning effects tend to be more significant when a technologically complex task is repeated because there is more to learn. Thus, learning effects will be more significant in an assembly process that has 1,000 complex steps than in a process with 100 simple steps. Although learning effects are normally associated with the manufacturing process, there is substantial evidence that they are just as important in service industries. One famous study of learning in the health-care industry discovered that more-experienced medical providers posted significantly lower mortality rates for a number of common surgical procedures, suggesting that learning effects are at work in surgery.[2] The authors of this study used the evidence to argue in favor of establishing regional referral centers for the provision of highly specialized medical care. These centers would perform many specific surgical procedures (such as heart surgery), replacing local facilities with lower volumes and presumably higher mortality rates. Another recent study found strong evidence of learning effects in a financial institution. This study looked at a newly established document-processing unit with 100 staff members and found that, over time, documents were processed much more rapidly as the staff learned the process. Overall, the study concluded that unit costs decreased every time the cumulative number of documents processed doubled.[3] Strategy in Action 4.1 looks at the determinants of differences in learning effects across a sample of hospitals performing cardiac surgery.

In terms of the unit cost curve of a company, economies of scale imply a movement along the curve (say, from A to B in Figure 4.3). The realization of learning effects implies a downward shift of the entire curve (B to C in Figure 4.3) as both labor and management become more efficient over time at performing their tasks at every

Figure 4.3 The Impact of Learning and Scale Economies on Unit Costs





4.1 STRATEGY IN ACTION

Learning Effects in Cardiac Surgery

Researchers at the Harvard Business School carried out a study to estimate the importance of learning effects in the case of a new technology for minimally invasive heart surgery that was approved by federal regulators. The researchers looked at 16 hospitals and obtained data on operations for 660 patients who underwent surgery using the new technology. They examined how the time required to undertake the procedure varied with cumulative experience. Across the 16 hospitals, they found that average time decreased from 280 minutes for the first procedure with the new technology to 220 minutes once a hospital had performed 50 procedures (note that not all hospitals performed 50 procedures, and the estimates represent an extrapolation based on the data).

Next, the study observed differences across hospitals; here they found evidence of very large differences in learning effects. One hospital, in particular, stood out. This hospital, which they called "Hospital M," reduced its net procedure time from 500 minutes on case 1 to 132 minutes by case 50. Hospital M's 88-minute procedure time advantage over the average hospital at case 50 meant a cost savings of approximately $2,250 per case, which allowed surgeons at the hospital to complete one more revenue-generating procedure per day.

The researchers inquired into factors that made Hospital M superior. They noted that all hospitals had similar, state-of-the-art operating rooms, all used the same devices, approved by the Food and Drug Administration (FDA), all surgeons who adopted the new technology completed the same training courses, and all surgeons came from highly respected training hospitals. Follow-up interviews, however, suggested that Hospital M differed in how it implemented the new procedure. The adopting surgeon handpicked the team that would perform the surgery. Members of the team had significant prior experience working together, which was a key criterion for member selection, and the team trained together to perform the surgery with the new technology. Before undertaking the surgery, the entire team met with the operating room nurses and anesthesiologists to discuss it. In addition, the adopting surgeon mandated that no changes would be made to either the team or the procedure in the early stages of using the technology. The initial team completed 15 procedures before members were added or substituted, and completed 20 cases before the procedure was modified. The adopting surgeon also insisted that the team meet prior to each of the first 10 cases, and after the first 20 cases, to debrief.

The picture that emerges is a core team selected and managed to maximize gains from learning Unlike other hospitals where team members and procedures were less consistent, and where there was not the same attention to briefing, debriefing, and learning, surgeons at Hospital M learned much faster and ultimately achieved higher productivity than their peers in other institutions. Clearly, differences in the implementation of the new procedure were very significant.

Source: G. P. Pisano, R. M. J. Bohmer, and A. C. Edmondson, "Organizational Differences in Rates of Learning: Evidence from the Adoption of Minimally Invasive Cardiac Surgery," Management Science 47 (2001): 752–768.

level of output. In accounting terms, learning effects in a production setting reduce the cost of goods sold as a percentage of revenues, enabling the company to earn a higher return on sales and return on invested capital.

No matter how complex the task, learning effects typically diminish in importance after a period of time. Indeed, it has been suggested that they are most important during the start-up period of a new process and become trivial after 2 or 3 years.[4] When a company's production system changes—as a result of the use of new information technology, for example—the learning process must begin again.

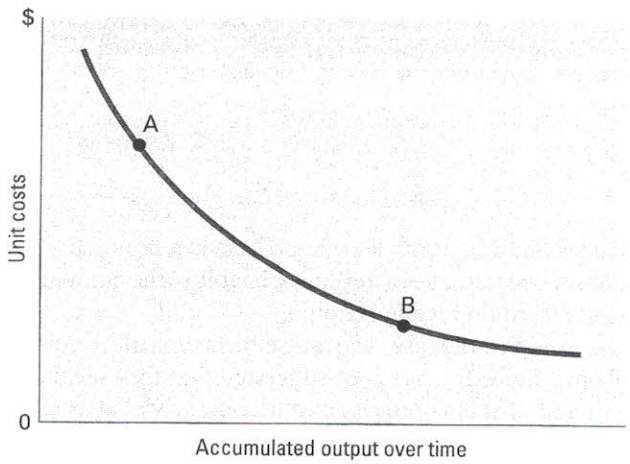
Efficiency and the Experience Curve

experience curve
The systematic lowering of the cost structure and consequent unit cost reductions that have been observed to occur over the life of a product.

The **experience curve** refers to the systematic lowering of the cost structure, and consequent unit cost reductions, that have been observed to occur over the life of a product.[5] According to the experience-curve concept, per-unit production costs for a product typically decline by some characteristic amount each time accumulated output of the product is doubled (accumulated output is the total output of a product since its introduction). This relationship was first observed in the aircraft industry, where it was found that each time the accumulated output of airframes doubled, unit costs declined to 80% of their previous level.[6] As such, the fourth airframe typically cost only 80% of the second airframe to produce, the eighth airframe only 80% of the fourth, the sixteenth only 80% of the eighth, and so on. The outcome of this process is a relationship between unit manufacturing costs and accumulated output similar to the illustration in Figure 4.3. Economies of scale and learning effects underlie the experience-curve phenomenon. Put simply, as a company increases the accumulated volume of its output over time, it is able to realize both economies of scale (as volume increases) and learning effects. Consequently, unit costs and cost structure fall with increases in accumulated output.

The strategic significance of the experience curve is clear: Increasing a company's product volume and market share will lower its cost structure relative to its rivals. In Figure 4.4, Company B has a cost advantage over Company A because of its lower cost structure, and because it is farther down the experience curve. This concept is very important in industries that mass-produce a standardized output—for example, the manufacture of semiconductor chips. A company that wishes to become more efficient and lower its cost structure must try to move down the experience curve as quickly as possible. This means constructing manufacturing facilities that are scaled for efficiency even before the company has generated demand for its product, and aggressively pursuing cost reductions from learning effects. It might also need to adopt an aggressive marketing strategy, cutting prices drastically and stressing heavy sales promotions and extensive advertising in order to build up demand and accumulated volume as quickly as possible. A company is likely to have a significant cost advantage

Figure 4.4 The Experience Curve



over its competitors because of its superior efficiency once it is down the experience curve. It has been argued that Intel uses such tactics to ride down the experience curve and gain a competitive advantage over its rivals in the microprocessor market.[7]

It is worth emphasizing that this concept is just as important outside of manufacturing. For example, as it invests in its distribution network, online retailer Amazon is trying to both realize economies of scale (spreading the fixed costs of its distribution centers over a large sales volume) and improve the efficiency of its inventory-management and order-fulfillment processes at distribution centers (a learning effect). Together these two sources of cost savings should enable Amazon to ride down the experience curve ahead of its rivals, thereby gaining a low-cost position that enables it to make greater profits at lower prices than its rivals.

Managers should not become complacent about efficiency-based cost advantages derived from experience effects. First, because neither learning effects nor economies of scale are sustained forever, the experience curve will bottom out at some point; it must do so by definition. When this occurs, further unit-cost reductions from learning effects and economies of scale will be difficult to attain. Over time, other companies can lower their cost structures and match the cost leader. Once this happens, many low-cost companies can achieve cost parity with each other. In such circumstances, a sustainable competitive advantage must rely on strategic factors other than the minimization of production costs by using existing technologies— factors such as better responsiveness to customers, product quality, or innovation.

Second, cost advantages gained from experience effects can be rendered obsolete by the development of new technologies. For example, the large, "big box" bookstores Borders and Barnes & Noble may have had cost advantages that were derived from economies of scale and learning. However, those advantages diminished when Amazon, utilizing Web technology, launched its online bookstore in 1994. By selling online, Amazon was able to offer a larger selection at a lower cost than established rivals with physical storefronts. When Amazon introduced its Kindle digital reader in 2007 and started to sell eBooks, it changed the basis of competition once more, effectively nullifying the experience-based advantage enjoyed by Borders and Barnes & Noble. By 2012, Borders was bankrupt and Barnes & Noble was in financial trouble and closing stores. Amazon, in the meantime, has gone from strength to strength.

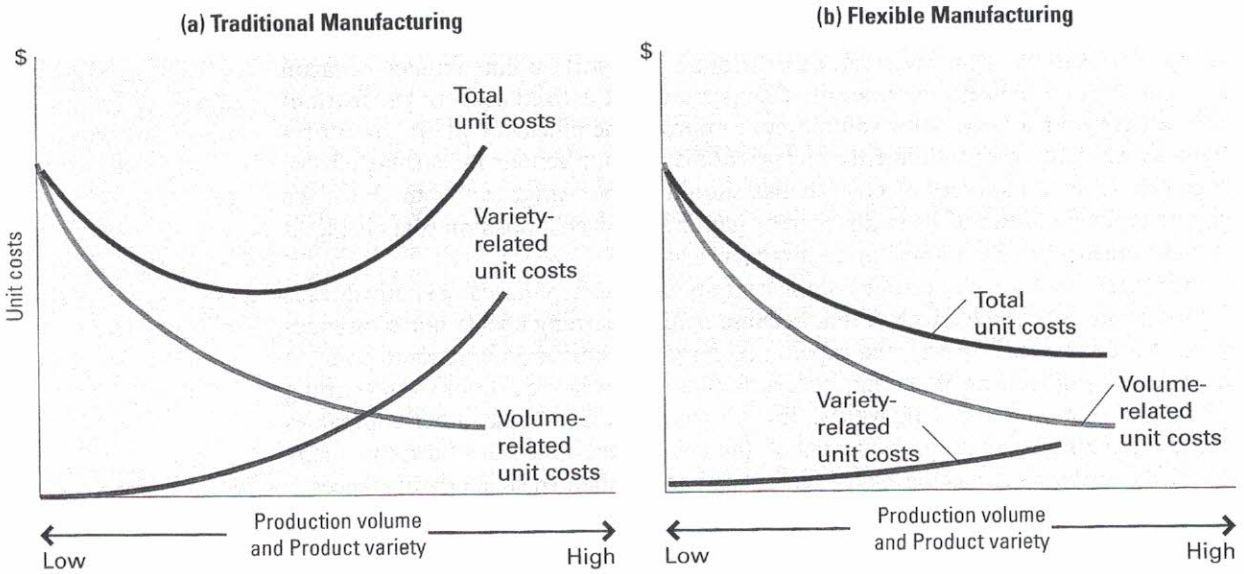
Efficiency, Flexible Production Systems, and Mass Customization

Central to the concept of economies of scale is the idea that a lower cost structure, attained through the mass production of a standardized output, is the best way to achieve high efficiency. There is an implicit tradeoff in this idea between unit costs and product variety. Wide product variety shipped from a single factory implies shorter production runs, which implies an inability to realize economies of scale and thus higher costs. That is, greater product variety makes it difficult for a company to increase its production efficiency and reduce its unit costs. According to this logic, the way to increase efficiency and achieve a lower cost structure is to limit product variety and produce a standardized product in large volumes (see Figure 4.5a).

This view of production efficiency has been challenged by the rise of flexible production technologies. The term **flexible production technology** covers a range of

flexible production technology
A range of technologies designed to reduce setup times for complex equipment, increase the use of machinery through better scheduling, and improve quality control at all stages of the manufacturing process.

Figure 4.5 Tradeoff Between Costs and Product Variety

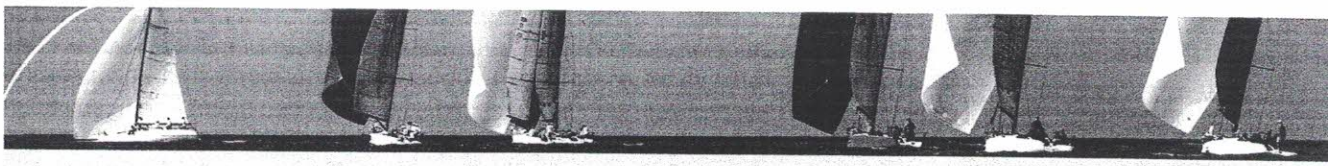


technologies designed to reduce setup times for complex equipment, increase the use of individual machines through better scheduling, and improve quality control at all stages of the manufacturing process.[8] Flexible production technologies allow the company to produce a wider variety of end products at a unit cost that at one time could be achieved only through the mass production of a standardized output (see Figure 4.5b). Research suggests that the adoption of flexible production technologies may increase efficiency and lower unit costs relative to what can be achieved by the mass production of a standardized output, while at the same time enabling the company to customize its product offering to a much greater extent than was once thought possible. The term **mass customization** has been coined to describe a company's ability to use flexible manufacturing technology to reconcile two goals that were once thought to be incompatible: low cost and differentiation through product customization.[9]

mass customization
The use of flexible manufacturing technology to reconcile two goals that were once thought to be incompatible: low cost and differentiation through product customization.

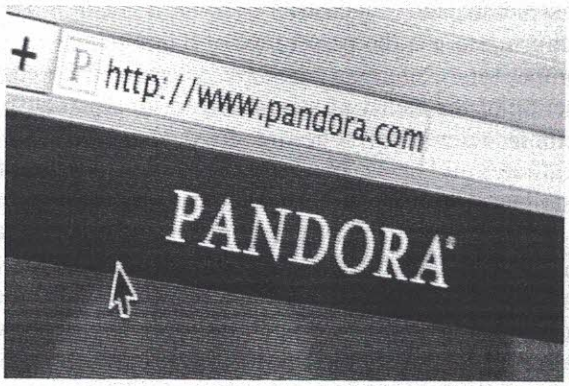
Dell Computer pursues a mass-customization strategy when it allows its customers to build their own machines online. Dell keeps costs and prices under control by allowing customers to make choices within a limited menu of options (different amounts of memory, hard-drive capacity, video card, microprocessor, and so on). The result is to create more value for customers than is possible for rivals that sell a limited range of PC models through retail outlets. Similarly, Mars offers a service, My M&Ms, that enables customers to design "personalized" M&Ms online. Customers can pick different colors and have messages or pictures printed on their M&Ms. Another example of mass customization is the Internet radio service Pandora, which is discussed in Strategy in Action 4.2.

The effects of installing flexible production technology on a company's cost structure can be dramatic. Over the last decade, the Ford Motor Company has been introducing such technologies in its automotive plants around the world. These technologies



4.2 STRATEGY IN ACTION

Pandora: Mass Customizing Internet Radio



M4OS Photos/Alamy

Pandora Media streams music to PCs and mobile devices. Customers start by typing in the kind of music that they want to listen to. With a database of over 100,000 artists, there is a good chance that Pandora has something for you, however particular your tastes. Customers can then rate the music that Pandora plays for them (thumbs up or down). Pandora takes this feedback and refines the music it streams to a customer. The company also uses sophisticated predictive statistical analysis (what do other customers who also like this song listen to?) and product analysis (what Pandora calls its Music Genome, which analyzes songs and identifies similar songs) to further customize the experience for the individual listener. The Music Genome has the added benefit of introducing listeners to new songs they might like based on an analysis of their listening habits. The result is a radio station attuned to each individual's unique listening preferences. This is mass customization at its most pure.

Launched in 2000, by late 2014 Pandora's annualized revenue run rate was 920 million. There were 250 million registered users and 77 million active users, giving Pandora a 78% share of the online radio market in the United States. Pandora's revenue comes primarily from advertising, although premium subscribers can pay $36 a year and get commercial-free music.

Despite its rapid growth—a testament to the value of mass customization—Pandora does have its problems. Pandora pays more than half of its revenue in royalties to music publishers. By comparison, satellite-radio company Sirius-XM pays out only 7.5% of its revenue in the form of royalties, and cable companies that stream music pay only 15%. The different royalty rates are due to somewhat arcane regulations under which three judges who serve on the Copyright Royalty Board, an arm of the Library of Congress, set royalty fees for radio broadcasters. This method of setting royalty rates has worked against Pandora, although the company is lobbying hard to have the law changed. Pandora is also facing growing competition from Spotify and Rdio, two customizable music-streaming services that have sold equity stakes to recording labels in exchange for access to their music libraries. There are also reports that Apple will soon be offering its own customizable music-streaming service. Whatever happens to Pandora in the long run, however, it would seem that the mass customization of Internet radio is here to stay.

Sources: A. Fixmer, "Pandora Is Boxed in by High Royalty Fees," Bloomberg Businessweek, December 24, 2012; E. Smith and J. Letzing, "At Pandora Each Sales Drives up Losses," *The Wall Street Journal*, December 6, 2012; E. Savitz, "Pandora Swoons on Weak Outlook," Forbes.com, December 5, 2012; G. Peoples, "Pandora Revenue up 40 percent, Listening Growth Softens," Billboardbiz, October 23, 2014.

have enabled Ford to produce multiple models from the same line and to switch production from one model to another much more quickly than in the past. Ford removed $2 billion out of its cost structure between 2006 and 2010 through flexible manufacturing, and is striving to remove more.[10]

Marketing and Efficiency

marketing strategy
The position that a company takes with regard to pricing, promotion, advertising, product design, and distribution.

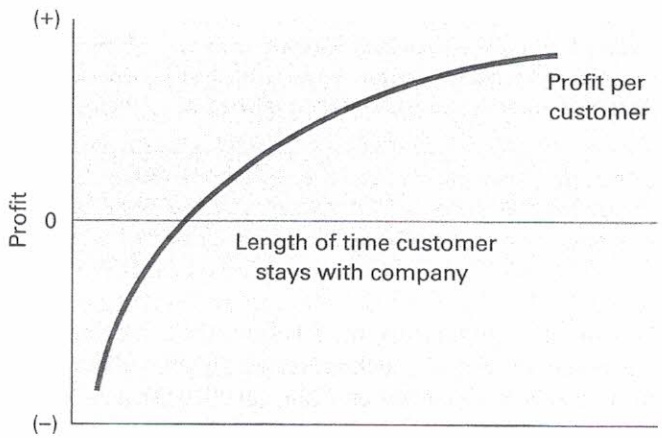
The marketing strategy that a company adopts can have a major impact on its efficiency and cost structure. **Marketing strategy** refers to the position that a company takes with regard to market segmentation, pricing, promotion, advertising, product design, and distribution. Some of the steps leading to greater efficiency are fairly obvious. For example, moving down the experience curve to achieve a lower cost structure can be facilitated by aggressive pricing, promotion, and advertising—all of which are tasks of the marketing function. Other aspects of marketing strategy have a less obvious—but no less important—impact on efficiency. One important aspect is the relationship of customer defection rates, cost structure, and unit costs.[11]

customer defection
The percentage of a company's customers who defect every year to competitors.

Customer defection (or "churn rate") is the percentage of a company's customers who defect every year to competitors. Defection rates are determined by customer loyalty, which in turn is a function of the ability of a company to satisfy its customers. Because acquiring a new customer often entails one-time fixed costs, there is a direct relationship between defection rates and costs. For example, when a wireless service company signs up a new subscriber, it has to bear the administrative cost of opening a new account and the cost of a subsidy that it pays to the manufacturer of the handset the new subscriber chooses. There are also the costs of advertising and promotions designed to attract new subscribers. The longer a company retains a customer, the greater the volume of customer-generated unit sales that can be set against these fixed costs, and the lower the average unit cost of each sale. Thus, lowering customer defection rates allows a company to achieve a lower cost structure.

One consequence of the defection–cost relationship illustrated in Figure 4.6. Because of the relatively high fixed costs of acquiring new customers, serving customers who stay with the company only for a short time before switching to competitors often leads to a loss on the investment made to acquire those customers. The longer a customer stays with the company, the more the fixed costs of acquiring that customer can be distributed over repeat purchases, boosting the profit per customer. Thus, there is a positive relationship between the length of time that a customer stays with a company and profit per customer.

Figure 4.6 The Relationship Between Customer Loyalty and Profit per Customer



A company that can reduce customer defection rates can make a much better return on its investment in acquiring customers, and thereby boost its profitability.

For example, consider the credit card business.[12] Most credit card companies spend an average of $50 per customer for recruitment and new account setup. These costs accrue from the advertising required to attract new customers, the credit checks required for each customer, and the mechanics of setting up an account and issuing a card. These one-time fixed costs can be recouped only if a customer stays with the company for at least 2 years. Moreover, when customers stay a second year, they tend to increase their use of the credit card, which raises the volume of revenues generated by each customer over time. As a result, although the credit card business loses $50 per customer in year 1, it makes a profit of $44 in year 3 and $55 in year 6.

Another economic benefit of long-time customer loyalty is the free advertising that customers provide for a company. Loyal customers can dramatically increase the volume of business through referrals. A striking example is Britain's largest retailer, the clothing and food company Marks & Spencer, whose success is built on a well-earned reputation for providing its customers with high-quality goods at reasonable prices. The company has generated such customer loyalty that it does not need to advertise in Britain—a major source of cost savings.

The key message, then, is that reducing customer defection rates and building customer loyalty can be major sources of a lower cost structure. One study has estimated that a 5% reduction in customer defection rates leads to the following increases in profits per customer over average customer life: 75% in the credit card business, 50% in the insurance brokerage industry, 45% in the industrial laundry business, and 35% in the computer software industry.[13]

A central component of developing a strategy to reduce defection rates is to identify customers who have defected, find out why they defected, and act on that information so that other customers do not defect for similar reasons in the future. To take these measures, the marketing function must have information systems capable of tracking customer defections.

MATERIALS MANAGEMENT, JUST-IN-TIME SYSTEMS, AND EFFICIENCY

The contribution of materials management (logistics) to boosting the efficiency of a company can be just as dramatic as the contribution of production and marketing. Materials management encompasses the activities necessary to get inputs and components to a production facility (including the costs of purchasing inputs), through the production process, and out through a distribution system to the end-user.[14] Because there are so many sources of cost in this process, the potential for reducing costs through more efficient materials-management strategies is enormous. For a typical manufacturing company, materials and transportation costs account for 50 to 70% of its revenues, so even a small reduction in these costs can have a substantial impact on profitability. According to one estimate, for a company with revenues of $1 million, a return on invested capital (ROIC) of 5% and materials-management costs that amount to 50% of sales revenues (including purchasing costs), increasing total profits by $15,000 would require either a 30% increase in sales revenues or a 3% reduction in

materials costs.[15] In a typical competitive market, reducing materials costs by 3% is usually much easier than increasing sales revenues by 30%.

Improving the efficiency of the materials-management function typically requires the adoption of a **just-in-time (JIT) inventory system**, which is designed to economize on inventory holding costs by scheduling components to arrive at a manufacturing plant just in time to enter the production process, or to have goods arrive at a retail store only when stock is almost depleted. The major cost saving comes from increasing inventory turnover, which reduces both inventory holding costs, such as warehousing and storage costs, and the company's need for working capital. For example, through efficient logistics, Wal-Mart can replenish the stock in its stores at least twice a week; many stores receive daily deliveries if they are needed. The typical competitor replenishes its stock every 2 weeks, so it must carry a much higher inventory, which requires more working capital per dollar of sales. Compared to its competitors, Wal-Mart can maintain the same service levels with a lower investment in inventory—a major source of its lower cost structure. Thus, faster inventory turnover has helped Wal-Mart achieve an efficiency-based competitive advantage in the retailing industry.[16]

just-in-time (JIT) inventory system
System of economizing on inventory holding costs by scheduling components to arrive just in time to enter the production process or only as stock is depleted.

More generally, in terms of the profitability model developed in Chapter 3, JIT inventory systems reduce the need for working capital (because there is less inventory to finance) and the need for fixed capital to finance storage space (because there is less to store), which reduces capital needs, increases capital turnover, and, by extension, boosts ROIC.

The drawback of JIT systems is that they leave a company without a buffer stock of inventory. Although buffer stocks are expensive to store, they can help a company prepare for shortages on inputs brought about by disruption among suppliers (for instance, a labor dispute at a key supplier), and can help a company respond quickly to increases in demand. However, there are ways around these limitations. For example, to reduce the risks linked to dependence on just one supplier for an important input, a company might decide to source inputs from multiple suppliers.

Recently, the efficient management of materials and inventory has been recast in terms of **supply chain management**: the task of managing the flow of inputs and components from suppliers into the company's production processes to minimize inventory holding and maximize inventory turnover. Dell, whose goal is to streamline its supply chain to such an extent that it 'replaces inventory with information,' is exemplary in terms of supply chain management.

supply chain management
The task of managing the flow of inputs and components from suppliers into the company's production processes to minimize inventory holding and maximize inventory turnover.

Research and Development Strategy and Efficiency

The role of superior research and development (R&D) in helping a company achieve a greater efficiency and a lower cost structure is twofold. First, the R&D function can boost efficiency by designing products that are easy to manufacture. By cutting down on the number of parts that make up a product, R&D can dramatically decrease the required assembly time, which results in higher employee productivity, lower costs, and higher profitability. For example, after Texas Instruments redesigned an infrared sighting mechanism that it supplies to the Pentagon, it found that it had reduced the number of parts from 47 to 12, the number of assembly steps from 56 to 13, the time spent fabricating metal from 757 minutes per unit to 219 minutes per unit, and unit assembly time from 129 minutes to 20 minutes. The result was a substantial decline in production costs. Design for manufacturing requires close coordination between the production and R&D functions of the company. Cross-functional teams that contain production and R&D personnel who work jointly can best achieve this.

Pioneering process innovations is the second way in which the R&D function can help a company achieve a lower cost structure. A process innovation is a new, unique way that production processes can operate more efficiently. Process innovations are often a major source of competitive advantage. Toyota's competitive advantage is based partly on the company's invention of new, flexible manufacturing processes that dramatically reduce setup times. This process innovation enabled Toyota to obtain efficiency gains associated with flexible manufacturing systems years ahead of its competitors.

Human Resource Strategy and Efficiency

Employee productivity is a key determinant of an enterprise's efficiency, cost structure, and profitability.[17] Productive manufacturing employees can lower the cost of goods sold as a percentage of revenues; a productive sales force can increase sales revenues for a given level of expenses; and productive employees in the company's R&D function can boost the percentage of revenues generated from new products for a given level of R&D expenses. Thus, productive employees lower the costs of generating revenues, increase the return on sales, and, by extension, boost the company's ROIC. The challenge for a company's human resource function is to devise ways to increase employee productivity. Among its choices are using certain hiring strategies, training employees, organizing the workforce into self-managing teams, and linking pay to performance.

Hiring Strategy

Many companies that are well known for their productive employees devote considerable attention to hiring. Southwest Airlines hires people who have a positive attitude and who work well in teams because it believes that people who have a positive attitude will work hard and interact well with customers, therefore helping to create customer loyalty. Nucor hires people who are self-reliant and goal-oriented because its employees, who work in self-managing teams, require these skills to perform well. As these examples suggest, it is important to be sure that the hiring strategy of the company is consistent with its internal organization, culture, and strategic priorities. A company's hires should have attributes that match its strategic objectives.

Employee Training

Employees are a major input into the production process. Those who are highly skilled can perform tasks faster and more accurately, and are more likely to learn the complex tasks associated with many modern production methods than individuals with lesser skills. Training upgrades employee skill levels, bringing the company productivity-related efficiency gains from learning and experimentation.[18]

Self-Managing Teams The use of **self-managing teams**, whose members coordinate their own activities and make their own hiring, training, work, and reward decisions, has been spreading rapidly. The typical team comprises 5 to 15 employees who produce an entire product or undertake an entire task. Team members learn all team tasks and rotate from job to job. Because a more flexible workforce is one result, team members can fill in for absent coworkers and take over managerial duties such as scheduling work and vacation, ordering materials, and hiring new members. The greater

self-managing teams
Teams where members coordinate their own activities and make their own hiring, training, work, and reward decisions.

responsibility delegated to team members, and the empowerment that it implies, are seen as motivators. (*Empowerment* is the process of giving lower-level employees decision-making power.) People often respond well to being given greater autonomy and responsibility. Performance bonuses linked to team production and quality targets work as an additional motivator.

The effect of introducing self-managing teams is reportedly an increase in productivity of 30% or more and a substantial increase in product quality. Further cost savings arise from eliminating supervisors and creating a flatter organizational hierarchy, which lowers the cost structure of the company. In manufacturing companies, perhaps the most potent way to lower the cost structure is to combine self-managing teams with flexible manufacturing cells. For example, after the introduction of flexible manufacturing technology and work practices based on self-managing teams, a General Electric (GE) plant in Salisbury, North Carolina, increased productivity by 250% compared with GE plants that produced the same products 4 years earlier.[19]

Still, teams are no panacea. In manufacturing companies, self-managing teams may fail to live up to their potential unless they are integrated with flexible manufacturing technology. Also, many management responsibilities are placed upon team members, and helping team members cope with these responsibilities often requires substantial training—a fact that many companies often forget in their rush to drive down costs. Haste can result in teams that don't work out as well as planned.[20]

Pay for Performance

It is hardly surprising that linking pay to performance can help increase employee productivity, but the issue is not quite as simple as just introducing incentive pay systems. It is also important to define what kind of job performance is to be rewarded and how. Some of the most efficient companies in the world, mindful that cooperation among employees is necessary to realize productivity gains, link pay to group or team (rather than individual) performance. Nucor Steel divides its workforce into teams of about 30, with bonus pay, which can amount to 30% of base pay, linked to the ability of the team to meet productivity and quality goals. This link creates a strong incentive for individuals to cooperate in pursuit of team goals; that is, it facilitates teamwork.

Information Systems and Efficiency

With the rapid spread of computers and devices, the explosive growth of the Internet and corporate intranets (internal corporate computer networks based on Internet standards), and the spread of high-bandwidth fiber-optics and digital wireless technology, the information systems function has moved to center stage in the quest for operating efficiencies and a lower cost structure.[21] The impact of information systems on productivity is wide ranging and potentially affects all other activities of a company. For example, Cisco Systems was able to realize significant cost savings by moving its ordering and customer service functions online. The company found it could operate with just 300 service agents handling all of its customer accounts, compared to the 900 it would need if sales were not handled online. The difference represented an annual savings of $20 million a year. Moreover, without automated customer service functions, Cisco calculated that it would need at least 1,000 additional service engineers, at a cost of close to $75 million.[22]

Like Cisco, many companies are using Web-based information systems to reduce the costs of coordination between the company and its customers and the company and its suppliers. By using Web-based programs to automate customer and supplier interactions, they can substantially reduce the staff required to manage these interfaces, thereby reducing costs. This trend extends beyond high-tech companies. Banks and financial-service companies are finding that they can substantially reduce costs by moving customer accounts and support functions online. Such a move reduces the need for customer service representatives, bank tellers, stockbrokers, insurance agents, and others. For example, it costs an average of about $1.07 to execute a transaction at a bank, such as shifting money from one account to another; executing the same transaction over the Internet costs $0.01.[23]

Similarly, the concept behind Internet-based retailers such as Amazon.com is that replacing physical stores and their supporting personnel with an online, virtual store and automated ordering and checkout processes allows a company to eliminate significant costs from the retailing system. Cost savings can also be realized by using Web-based information systems to automate many internal company activities, from managing expense reimbursements to benefits planning and hiring processes, thereby reducing the need for internal support personnel.

Infrastructure and Efficiency

A company's infrastructure—including its organizational structure, culture, style of strategic leadership, and control system—determines the context within which all other value creation activities take place. It follows that improving infrastructure can help a company increase efficiency and lower its cost structure. Above all, an appropriate infrastructure can help foster a companywide commitment to efficiency and promote cooperation among different functions in pursuit of efficiency goals. These issues are addressed at length in Chapter 12.

For now, it is important to note that strategic leadership is especially important in building a companywide commitment to efficiency. The leadership task is to articulate a vision that recognizes the need for all functions of a company to focus on improving efficiency. It is not enough to improve the efficiency of production, or of marketing, or of R&D in a piecemeal fashion. Achieving superior efficiency requires a companywide commitment to this goal that must be articulated by general and functional managers. A further leadership task is to facilitate the cross-functional cooperation needed to achieve superior efficiency. For example, designing products that are easy to manufacture requires that production and R&D personnel communicate; integrating JIT systems with production scheduling requires close communication between materials management and production; and designing self-managing teams to perform production tasks requires close cooperation between human resources and production.

Summary

Table 4.1 summarizes the primary roles of various functions in achieving superior efficiency. Keep in mind that achieving superior efficiency is not something that can be tackled on a function-by-function basis. It requires organizationwide commitment and the ability to ensure close cooperation among functions. Top management, by exercising leadership and influencing the infrastructure, plays a significant role in this process.

Table 4.1 Primary Roles of Value Creation Functions in Achieving Superior Efficiency

Value Creation Function	Primary Roles
Infrastructure (leadership)	1. Provide companywide commitment to efficiency.
	2. Facilitate cooperation among functions.
Production	1. Where appropriate, pursue economies of scale and learning economics.
	2. Implement flexible manufacturing systems.
Marketing	1. Where appropriate, adopt aggressive marketing to ride down the experience curve.
	2. Limit customer defection rates by building brand loyalty.
Materials management	1. Implement JIT systems.
	2. Implement supply chain coordination.
R&D	1. Design products for ease of manufacture.
	2. Seek process innovations.
Information systems	1. Use information systems to automate processes.
	2. Use information systems to reduce costs of coordination.
Human resources	1. Institute training programs to build skills.
	2. Implement self-managing teams.
	3. Implement pay for performance.

ACHIEVING SUPERIOR QUALITY

In Chapter 3, we noted that quality can be thought of in terms of two dimensions: *quality as reliability* and *quality as excellence*. High-quality products are reliable, do well the job for which they were designed, and are perceived by consumers to have superior attributes. We also noted that superior quality provides a company with two advantages. First, a strong reputation for quality allows a company to differentiate its products from those offered by rivals, thereby creating more value in the eyes of customers and giving the company the option of charging a premium price for its products. Second, eliminating defects or errors from the production process reduces waste, increases efficiency, lowers the cost structure of the company, and increases its profitability. For example, reducing the number of defects in a company's manufacturing process will lower the cost of goods sold as a percentage of revenues, thereby raising the company's return on sales and ROIC. In this section, we look in more depth at what managers can do to enhance the reliability and other attributes of the company's product offering.

Attaining Superior Reliability

The principal tool that most managers now use to increase the reliability of their product offering is the Six Sigma quality improvement methodology. Six Sigma is a direct descendant of the **total quality management** (TQM) philosophy that was widely adopted, first by Japanese companies and then by American companies, during the 1980s and early 1990s.[24] The TQM concept was developed by a number of American management consultants, including W. Edwards Deming, Joseph Juran, and A. V. Feigenbaum.[25]

total quality management
Increasing product reliability so that it consistently performs as it was designed to and rarely breaks down.

Originally, these consultants won few converts in the United States. However, managers in Japan embraced their ideas enthusiastically, and even named their premier annual prize for manufacturing excellence after Deming. Underlying TQM, according to Deming, are five factors:

1. Improved quality means that costs decrease because of less rework, fewer mistakes, fewer delays, and better use of time and materials.
2. As a result, productivity improves.
3. Better quality leads to higher market share and allows the company to raise prices.
4. Higher prices increase the company's profitability and allow it to stay in business.
5. Thus, the company creates more jobs.[26]

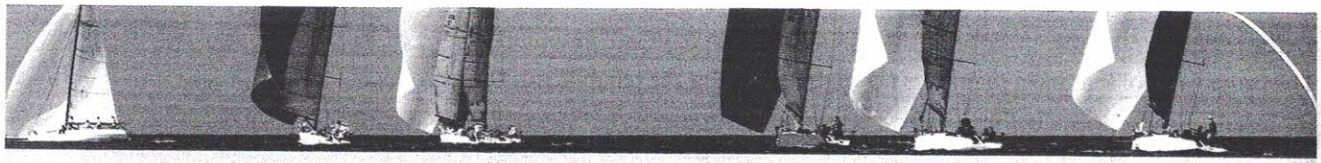
Deming identified a number of steps that should be part of any quality improvement program:

1. Management should embrace the philosophy that mistakes, defects, and poor-quality materials are not acceptable and should be eliminated.
2. Quality of supervision should be improved by allowing more time for supervisors to work with employees, and training employees in appropriate skills for the job.
3. Management should create an environment in which employees will not fear reporting problems or recommending improvements.
4. Work standards should not only be defined as numbers or quotas, but should also include some notion of quality to promote the production of defect-free output.
5. Management is responsible for training employees in new skills to keep pace with changes in the workplace.
6. Achieving better quality requires the commitment of everyone in the company.

Western businesses were blind to the importance of the TQM concept until Japan rose to the top rank of economic powers in the 1980s. Since that time, quality improvement programs have spread rapidly throughout Western industry. Strategy in Action 4.3 describes one of the most successful implementations of a quality improvement process, General Electric's Six Sigma program.

Implementing Reliability Improvement Methodologies

Among companies that have successfully adopted quality improvement methodologies, certain imperatives stand out. These are discussed in the following sections in the order in which they are usually tackled in companies implementing quality improvement programs. However, it is essential to understand that improvement in product reliability is a cross-functional process. Its implementation requires close cooperation among all functions in the pursuit of the common goal of improving quality; it is a process that works across functions. The roles played by the different functions in implementing reliability improvement methodologies are summarized in Table 4.2.



4.3 STRATEGY IN ACTION

General Electric's Six Sigma Quality Improvement Process

Six Sigma, a quality and efficiency program adopted by many major corporations, including Motorola, General Electric, and AlliedSignal, aims to reduce defects, boost productivity, eliminate waste, and cut costs throughout a company. "Sigma" refers to the Greek letter that statisticians use to represent a standard deviation from a mean: the higher the number of sigmas, the smaller the number of errors. At Six Sigma, a production process would be 99.99966% accurate, creating just 3.4 defects per million units. Although it is almost impossible for a company to achieve such precision, several companies strive toward that goal.

General Electric (GE) is perhaps the most well-known adopter of the Six Sigma program. Under the direction of long-serving CEO Jack Welch, GE spent nearly $1 billion to convert all of its divisions to the Six Sigma method.

One of the first products designed using Six Sigma processes was a $1.25-million diagnostic computer tomography (CT) scanner, the LightSpeed VCT, which produces rapid, three-dimensional images of the human body. The new scanner captured multiple images simultaneously, requiring only 20 seconds to do full-body scans that once took 3 minutes—important because patients must remain perfectly still during the scan. GE spent $50 million to run 250 separate Six Sigma analyses designed to improve the reliability and lower the manufacturing cost of the new scanner. Its efforts were rewarded when LightSpeed VCT's first customers soon noticed that it ran without downtime between patients—a testament to its reliability.

Achieving that reliability took immense work. GE's engineers deconstructed the scanner into its basic components and tried to improve the reliability of each component through a detailed step-by-step analysis. For example, the most important components of CT scanners are vacuum tubes that focus x-ray waves. The tubes that GE used in previous scanners, which cost $60,000 each, suffered from low reliability. Hospitals and clinics wanted the tubes to operate for 12 hours a day for at least 6 months, but typically they lasted only half that long. Moreover, GE was scrapping some $20 million in tubes each year because they failed preshipping performance tests, and disturbing numbers of faulty tubes were slipping past inspection, only to prove dysfunctional upon arrival.

To try to solve the reliability problem, the Six Sigma team took the tubes apart. They knew that one problem was a petroleum-based oil used in the tubes to prevent short circuits by isolating the anode (which has a positive charge) from the negatively charged cathode. The oil often deteriorated after a few months, leading to short circuits, but the team did not know why. Using statistical "what-if" scenarios on all parts of the tube, the researchers discovered that the lead-based paint on the inside of the tube was contaminating the oil. Acting on this information, the team developed a paint that would preserve the tube and protect the oil.

By pursuing this and other improvements, the Six Sigma team was able to extend the average life of a vacuum tube in the CT scanner from 3 months to over 1 year. Although the improvements increased the cost of the tube from $60,000 to $85,000, the increased cost was outweighed by the reduction in replacement costs, making it an attractive proposition for customers.

Source: C. H. Deutsch, "Six-Sigma Enlightenment," *New York Times*, December 7, 1998, p. 1; J. J. Barshay, "The Six-Sigma Story," *Star Tribune*, June 14, 1999, p. 1; D. D. Bak, "Rethinking Industrial Drives," Electrical/Electronics Technology, November 30, 1998, p. 58. G. Eckes, *The Six-Sigma Revolution* (New York: Wiley, 2000); General Electric, "What Is Six Sigma?," http://www.ge.com/en/company/companyinfo/quality/whatis.htm.

Table 4.2 Roles Played by Different Functions in Implementing Reliability Improvement Methodologies

Infrastructure (leadership)	1. Provide leadership and commitment to quality.
	2. Find ways to measure quality.
	3. Set goals and create incentives.
	4. Solicit input from employees.
	5. Encourage cooperation among functions.
Production	1. Shorten production runs.
	2. Trace defects back to the source.
Marketing	1. Focus on the customer.
	2. Provide customer feedback on quality.
Materials management	1. Rationalize suppliers.
	2. Help suppliers implement quality improvement methodologies.
	3. Trace defects back to suppliers.
R&D	1. Design products that are easy to manufacture.
Information systems	1. Use information systems to monitor defect rates.
Human resources	1. Institute quality improvement training programs.
	2. Identify and train black belts.
	3. Organize employees into quality teams

First, it is important that senior managers agree to a quality improvement program and communicate its importance to the organization. Second, if a quality improvement program is to be successful, individuals must be identified to lead the program. Under the Six Sigma methodology, exceptional employees are identified and put through a "black belt" training course on the Six Sigma methodology. The black belts are taken out of their normal job roles, and assigned to work solely on Six Sigma projects for the next 2 years. In effect, the black belts become internal consultants *and* project leaders. Because they are dedicated to Six Sigma programs, the black belts are not distracted from the task at hand by day-to-day operating responsibilities. To make a black belt assignment attractive, many companies now endorse the program as an advancement in a career path. Successful black belts might not return to their prior job after 2 years, but could instead be promoted and given more responsibility.

Third, quality improvement methodologies preach the need to identify defects that arise from processes, trace them to their source, find out what caused the defects, and make corrections so that they do not recur. Production and materials management are primarily responsible for this task. To uncover defects, quality improvement

methodologies rely upon the use of statistical procedures to pinpoint variations in the quality of goods or services. Once variations have been identified, they must be traced to their respective sources and eliminated.

One technique that helps greatly in tracing defects to the source is reducing lot sizes for manufactured products. With short production runs, defects show up immediately. Consequently, they can quickly be sourced, and the problem can be rectified. Reducing lot sizes also means that defective products will not be produced in large lots, thus decreasing waste. Flexible manufacturing techniques can be used to reduce lot sizes without raising costs. JIT inventory systems also play a part. Under a JIT system, defective parts enter the manufacturing process immediately; they are not warehoused for several months before use. Hence, defective inputs can be quickly spotted. The problem can then be traced to the supply source and corrected before more defective parts are produced. Under a more traditional system, the practice of warehousing parts for months before they are used may mean that suppliers deliver large quantities of parts with defects before they are detected in the production process.

Fourth, another key to any quality improvement program is to create a metric that can be used to measure quality. In manufacturing companies, quality can be measured by criteria such as defects per million parts. In service companies, suitable metrics can be devised with a little creativity. For example, one of the metrics Florida Power & Light uses to measure quality is meter-reading errors per month.

Fifth, once a metric has been devised, the next step is to set a challenging quality goal and create incentives for reaching it. Under Six Sigma programs, the goal is 3.4 defects per million units. One way of creating incentives to attain such a goal is to link rewards such as bonus pay and promotional opportunities to the goal.

Sixth, shop floor employees can be a major source of ideas for improving product quality, so these employees must participate and be incorporated into a quality improvement program.

Seventh, a major source of poor-quality finished goods is poor-quality component parts. To decrease product defects, a company must work with its suppliers to improve the quality of the parts they supply.

Eighth, the more assembly steps a product requires, the more opportunities there are for mistakes. Thus, designing products with fewer parts is often a major component of any quality improvement program.

Finally, implementing quality improvement methodologies requires organizationwide commitment and substantial cooperation among functions. R&D must cooperate with production to design products that are easy to manufacture; marketing must cooperate with production and R&D so that customer problems identified by marketing can be acted on; and human resource management must cooperate with all the other functions of the company in order to devise suitable quality-training programs.

Improving Quality as Excellence

As we stated in Chapter 3, a product is comprised of different attributes. Reliability is just one attribute, albeit an important one. Products can also be *differentiated* by attributes that collectively define product excellence. These attributes include the form, features, performance, durability, and styling of a product. In addition, a company can create quality as excellence by emphasizing attributes of the service associated with the

Table 4.3 Attributes Associated with a Product Offering

Product Attributes	Service Attributes	Associated Personnel Attributes
Form	Ordering ease	Competence
Features	Delivery	Courtesy
Performance	Installation	Credibility
Durability	Customer training	Reliability
Reliability	Customer consulting	Responsiveness
Style	Maintenance and repair	Communication

product. Dell Inc., for example, differentiates itself on ease of ordering (via the Web), prompt delivery, easy installation, and the ready availability of customer support and maintenance services. Differentiation can also be based on the attributes of the people in the company with whom customers interact when making a purchase, such as competence, courtesy, credibility, responsiveness, and communication. Singapore Airlines enjoys an excellent reputation for quality service, largely because passengers perceive their flight attendants as competent, courteous, and responsive to their needs. Thus, we can talk about the product attributes, service attributes, and personnel attributes associated with a company's product offering (see Table 4.3).

To be regarded as being high in the excellence dimension, a company's product offering must be seen as superior to that of rivals. Achieving a perception of high quality on any of these attributes requires specific actions by managers. First, it is important for managers to collect marketing intelligence indicating which attributes are most important to customers. For example, consumers of personal computers (PCs) may place a low weight on durability because they expect their PCs to be made obsolete by technological advances within 3 years, but they may place a high weight on features and performance. Similarly, ease of ordering and timely delivery may be very important attributes for customers of online booksellers (as indeed they are for customers of Amazon.com), whereas customer training and consulting may be very important attributes for customers who purchase complex, business-to-business software to manage their relationships with suppliers.

Second, once the company has identified the attributes that are important to customers, it needs to design its products (and the associated services) in such a way that those attributes are embodied in the product. It also needs to train personnel in the company so that the appropriate attributes are emphasized during design creation. This requires close coordination between marketing and product development (the topic of the next section) and the involvement of the human resource management function in employee selection and training.

Third, the company must decide which significant attributes to promote and how best to position them in the minds of consumers; that is, how to tailor the marketing message so that it creates a consistent image in the minds of customers.[27] At this point, it is important to recognize that although a product might be differentiated on the basis of six attributes, covering all of those attributes in the

company's communications may lead to an unfocused message. Many marketing experts advocate promoting only one or two central attributes. For example, Volvo consistently emphasizes the safety and durability of its vehicles in all marketing messages, creating the perception in the minds of consumers (backed by product design) that Volvos are safe and durable. Volvos are also very reliable and have high performance, but the company does not emphasize these attributes in its marketing messages. In contrast, Porsche emphasizes performance and styling in all of its marketing messages; thus, a Porsche is positioned differently in the minds of consumers than Volvo. Both are regarded as high-quality products because both have superior attributes, but each company differentiates its models from the average car by promoting distinctive attributes.

Finally, it must be recognized that competition is not stationary, but instead continually produces improvement in product attributes, and often the development of new-product attributes. This is obvious in fast-moving high-tech industries where product features that were considered leading edge just a few years ago are now obsolete—but the same process is also at work in more stable industries. For example, the rapid diffusion of microwave ovens during the 1980s required food companies to build new attributes into their frozen-food products: they had to maintain their texture and consistency while being cooked in the microwave; a product could not be considered high quality unless it could do that. This speaks to the importance of a strong R&D function within the company that can work with marketing and manufacturing to continually upgrade the quality of the attributes that are designed into the company's product offerings. Exactly how to achieve this is covered in the next section.

ACHIEVING SUPERIOR INNOVATION

In many ways, innovation is the most important source of competitive advantage. This is because innovation can result in new products that better satisfy customer needs, can improve the quality (attributes) of existing products, or can reduce the costs of making products that customers want. The ability to develop innovative new products or processes gives a company a major competitive advantage that allows it to: (1) differentiate its products and charge a premium price, and/or (2) lower its cost structure below that of its rivals. Competitors, however, attempt to imitate successful innovations and often succeed. Therefore, maintaining a competitive advantage requires a continuing commitment to innovation.

Successful new-product launches are major drivers of superior profitability. Robert Cooper reviewed more than 200 new-product introductions and found that of those classified as successes, some 50% achieve a return on investment in excess of 33%, half have a payback period of 2 years or less, and half achieve a market share in excess of 35%.[28] Many companies have established a track record for successful innovation. Among them are Apple, whose successes include the iPod, iPhone, and iPad; Pfizer, a drug company that during the 1990s and early 2000s produced eight new blockbuster drugs; 3M, which has applied its core competency in tapes and adhesives to developing a wide range of new products; and Intel, which has consistently managed to lead in the development of innovative microprocessors to run PCs.

The High Failure Rate of Innovation

Although promoting innovation can be a source of competitive advantage, the failure rate of innovative products is high. Research evidence suggests that only 10 to 20% of major R&D projects give rise to commercial products.[29] Well-publicized product failures include Apple's Newton, an early, handheld computer that flopped in the marketplace; Sony's Betamax format in the videocassette recorder segment; Sega's Dreamcast videogame console; and Windows Mobile, an early smartphone operating system created by Microsoft that was made obsolete in the eyes of consumers by the arrival of Apple's iPhone. Although many reasons have been advanced to explain why so many new products fail to generate an economic return, five explanations for failure repeatedly appear.[30]

First, many new products fail because the demand for innovation is inherently uncertain. It is impossible to know prior to market introduction whether the new product has tapped an unmet customer need, and if there is sufficient market demand to justify manufacturing the product. Although good market research can reduce the uncertainty about likely future demand for a new technology, that uncertainty cannot be fully eradicated; a certain failure rate is to be expected.

Second, new products often fail because the technology is poorly commercialized. This occurs when there is definite customer demand for a new product, but the product is not well adapted to customer needs because of factors such as poor design and poor quality. For instance, the failure of Microsoft to establish an enduring, dominant position in the market for smartphones, despite the fact that phones using the Windows Mobile operating system were introduced in 2003—4 years before Apple's iPhone hit the market—can be traced to its poor design. Windows Mobile phones had a physical keyboard, and a small, cluttered screen that was difficult to navigate, which made the product unattractive to many consumers. In contrast, the iPhone's large touchscreen and associated keyboard appealed to many consumers, who rushed out to buy it in droves.

Third, new products may fail because of poor positioning strategy. **Positioning strategy** is the specific set of options a company adopts for a product based upon four main dimensions of marketing: price, distribution, promotion and advertising, and product features. Apart from poor design, another reason for the failure of Windows Mobile phones was poor positioning strategy. They were targeted at business users, whereas Apple developed a mass market by targeting the iPhone at retail consumers.

positioning strategy
The specific set of options a company adopts for a product based upon four main dimensions of marketing: price, distribution, promotion and advertising, and product features.

Fourth, many new-product introductions fail because companies make the mistake of marketing a technology for which there is not enough demand. A company can become blinded by the wizardry of a new technology and fail to determine whether there is sufficient customer demand for it. A classic example is the Segway two-wheeled personal transporter. Despite the fact that its gyroscopic controls were highly sophisticated, and that the product introduction was accompanied by massive media hype, sales fell well below expectations when it transpired that most consumers had no need for such a conveyance.

Finally, companies fail when products are slowly marketed. The more time that elapses between initial development and final marketing—the slower the "cycle time"—the more likely it is that a competitor will beat the company to market and gain a first-mover advantage.[31] In the car industry, General Motors long suffered from being a slow innovator. Its typical product development cycle used to be about 5 years, compared with 2 to 3 years at Honda, Toyota, and Mazda, and 3 to 4 years at Ford. Because GM's offerings were based on 5-year-old technology and design concepts, they are already out of date when they reached the market.

Reducing Innovation Failures

One of the most important things that managers can do to reduce the high failure rate associated with innovation is to make sure that there is tight integration between R&D, production, and marketing.[32] Tight, cross-functional integration can help a company ensure that:

1. Product development projects are driven by customer needs.
2. New products are designed for ease of manufacture.
3. Development costs are not allowed to spiral out of control.
4. The time it takes to develop a product and bring it to market is minimized.
5. Close integration between R&D and marketing is achieved to ensure that product development projects are driven by the needs of customers.

A company's customers can be a primary source of new-product ideas. The identification of customer needs, particularly unmet needs, can set the context within which successful product innovation takes place. As the point of contact with customers, the marketing function can provide valuable information. Moreover, integrating R&D and marketing is crucial if a new product is to be properly commercialized—otherwise, a company runs the risk of developing products for which there is little or no demand.

Integration between R&D and production can help a company ensure that products are designed with manufacturing requirements in mind. Design for manufacturing lowers manufacturing costs and leaves less room for error; thus it can lower costs and increase product quality. Integrating R&D and production can help lower development costs and speed products to market. If a new product is not designed with manufacturing capabilities in mind, it may prove too difficult to build with existing manufacturing technology. In that case, the product will need to be redesigned, and both overall development costs and time to market may increase significantly. Making design changes during product planning can increase overall development costs by 50% and add 25% to the time it takes to bring the product to market.[33]

One of the best ways to achieve cross-functional integration is to establish cross-functional product development teams composed of representatives from R&D, marketing, and production. The objective of a team should be to oversee a product development project from initial concept development to market introduction. Specific attributes appear to be important in order for a product development team to function effectively and meet all its development milestones.[34]

First, a project manager who has high status within the organization and the power and authority required to secure the financial and human resources that the team needs to succeed should lead the team and be dedicated primarily, if not entirely, to the project. The leader should believe in the project (be a champion for the project) and be skilled at integrating the perspectives of different functions and helping personnel from different functions work together for a common goal. The leader should also act as an advocate of the team to senior management.

Second, the team should be composed of at least one member from each key function or position. Individual team members should have a number of attributes, including an ability to contribute functional expertise, high standing within their function, a willingness to share responsibility for team results, and an ability to put functional advocacy aside. It is generally preferable if core team members are 100% dedicated to the project for its duration. This ensures that their focus is on the project, not on their ongoing, individual work.

Third, team members work in proximity to one another to create a sense of camaraderie and facilitate communication. Fourth, the team should have a clear plan and clear goals, particularly with regard to critical development milestones and development budgets. The team should have incentives to attain those goals; for example, bonuses paid when major development milestones are attained. Fifth, each team needs to develop its own processes for communication, as well as conflict resolution. For example, one product development team at Quantum Corporation, a California-based manufacturer of disk drives for PCs, mandated that all major decisions would be made and conflicts resolved during meetings that were held every Monday afternoon. This simple rule helped the team meet its development goals.[35]

Finally, there is substantial evidence that developing competencies in innovation requires managers to proactively learn from their experience with product development, and to incorporate the lessons from past successes and failures into future new-product development processes.[36] This is easier said than done. To learn, managers need to undertake an objective assessment after a product development project has been completed, identifying key success factors and the root causes of failures, and allocating resources to repairing failures. Leaders also must admit their own failures if they are to encourage other team members to responsibly identify what they did wrong.

The primary role that the various functions play in achieving superior innovation is summarized in Table 4.4. The table makes two matters clear. First, top management must bear primary responsibility for overseeing the entire development process. This entails both managing the development process and facilitating cooperation among the functions. Second, the effectiveness of R&D in developing new products and processes depends upon its ability to cooperate with marketing and production.

Table 4.4 Functional Roles for Achieving Superior Innovation

Value Creation Function	Primary Roles
Infrastructure (leadership)	1. Manage overall project (i.e., manage the development function). 2. Facilitate cross-functional cooperation.
Production	1. Cooperate with R&D on designing products that are easy to manufacture. 2. Work with R&D to develop process innovations.
Marketing	1. Provide market information to R&D. 2. Work with R&D to develop new products.
Materials management	No primary responsibility.
R&D	1. Develop new products and processes. 2. Cooperate with other functions, particularly marketing and manufacturing, in the development process.
Information systems	1. Use information systems to coordinate cross-functional, cross-company product development.
Human resources	1. Hire talented scientists and engineers.

ACHIEVING SUPERIOR CUSTOMER RESPONSIVENESS

To achieve superior customer responsiveness, a company must give customers what they want, when they want it, and at a price they are willing to pay—and not compromise the company's long-term profitability in the process. Customer responsiveness is an important differentiating attribute that can help build brand loyalty. Strong product differentiation and brand loyalty give a company more pricing options; it can charge a premium price for its products, or keep prices low to sell more goods and services to customers. Whether prices are at a premium or kept low, the company that is most responsive to customers' needs will gain the competitive advantage.

Achieving superior responsiveness to customers means giving customers value for their money, and steps taken to improve the efficiency of a company's production process and the quality of its products should be consistent with this aim. In addition, giving customers what they want may require the development of new products with new features. In other words, achieving superior efficiency, quality, and innovation are all part of achieving superior responsiveness to customers. There are two other prerequisites for attaining this goal. First, a company must develop a competency in listening to its customers, focusing on its customers, and investigating and identifying their needs. Second, it must constantly seek better ways to satisfy those needs.

Focusing on the Customer

A company cannot respond to its customers' needs unless it knows what those needs are. Thus, the first step to building superior customer responsiveness is to motivate the entire company to focus on the customer. The means to this end are demonstrating leadership, shaping employee attitudes, and using mechanisms for making sure that customer needs are well known within the company.

Demonstrating Leadership

Customer focus must emanate from the top of the organization on down. A commitment to superior responsiveness to customers brings attitudinal changes throughout a company that can only be built through strong leadership. A mission statement that puts customers first is one way to send a clear message to employees about the desired focus. Another avenue is top management's own actions. For example, Tom Monaghan, the founder of Domino's Pizza, stayed close to the customer by eating Domino's pizza regularly, visiting as many stores as possible every week, running some deliveries himself, and insisting that top managers do the same.[37]

Shaping Employee Attitudes

Leadership alone is not enough to attain superior customer responsiveness. All employees must see the customer as the focus of their activity and be trained to concentrate on the customer—whether their function is marketing, manufacturing, R&D, or accounting. The objective should be to put employees in customers' shoes, a perspective that enables them to become better able to identify ways to improve the quality of a customer's experience with the company.

To reinforce this mindset, incentive systems should reward employees for satisfying customers. For example, senior managers at the Four Seasons hotel chain, who pride themselves on customer focus, tell the story of Roy Dyment, a doorman in Toronto who neglected to load a departing guest's briefcase into his taxi. The doorman called the guest, a lawyer, in Washington, D.C., and found that he desperately needed the briefcase for a morning meeting. Dyment hopped on a plane to Washington and returned it—without first securing approval from his boss. Far from punishing Dyment for not checking with management before going to Washington, the Four Seasons responded by naming Dyment Employee of the Year.[38] This sent a powerful message to Four Seasons employees, stressing the importance of satisfying customer needs.

Knowing Customer Needs

"Know thy customer" is one of the keys to achieving superior responsiveness to customers. Knowing the customer not only requires that employees think like customers; it also demands that they listen to what customers have to say. This involves communicating customers' opinions by soliciting feedback from customers on the company's goods and services, and by building information systems that disseminate the feedback to the relevant people.

For an example, consider clothing retailer Lands' End. Through its catalog, the Internet, and customer-service telephone operators, Lands' End actively solicits comments about the quality of its clothing and the kind of merchandise customers want Lands' End to supply. Indeed, it was customer insistence that initially prompted the company to move into the clothing segment. Lands' End formerly supplied equipment for sailboats through mail-order catalogs. However, it received so many requests from customers to include outdoor clothing in its offering that it responded by expanding the catalog to fill this need. Soon, clothing became its main business, and Lands' End ceased selling sailboat equipment. Today, the company continues to pay close attention to customer requests. Every month, data on customer requests and comments is reported to managers. This feedback helps the company fine-tune the merchandise it sells; new lines of merchandise are frequently introduced in response to customer requests.

Satisfying Customer Needs

Once customer focus is integral to the organization, the next requirement is to satisfy those customer needs that have been identified. As already noted, efficiency, quality, and innovation are crucial competencies that help a company satisfy customer needs. Beyond that, companies can provide a higher level of satisfaction if they differentiate their products by (1) customizing them, where possible, to the requirements of individual customers, and (2) reducing the time it takes to respond to or satisfy customer needs.

Customization

Customization involves varying the features of a good or service to tailor it to the unique needs or tastes of a group of customers, or—in the extreme case—individual customers. Although extensive customization can raise costs, the development of flexible manufacturing technologies has made it possible to customize products to a greater extent than was feasible 10 to 15 years ago, without experiencing a prohibitive rise in cost structure (particularly when flexible manufacturing technologies are linked

with Web-based information systems). For example, online retailers such as Amazon.com have used Web-based technologies to develop a homepage customized for each individual user. When a customer accesses Amazon.com, he or she is offered a list of recommended books and music to purchase based on an analysis of prior buying history—a powerful competency that gives Amazon.com a competitive advantage.

The trend toward customization has fragmented many markets, particularly customer markets, into ever-smaller niches. An example of this fragmentation occurred in Japan in the early 1980s when Honda dominated the motorcycle market there. Second-place Yamaha was determined to surpass Honda's lead. It announced the opening of a new factory that, when operating at full capacity, would make Yamaha the world's largest manufacturer of motorcycles. Honda responded by proliferating its product line and increasing its rate of new-product introduction. At the start of what became known as the "Motorcycle Wars," Honda had 60 motorcycles in its product line. Over the next 18 months thereafter, it rapidly increased its range to 113 models, customizing them to ever-smaller niches. Because of its competency in flexible manufacturing, Honda accomplished this without bearing a prohibitive cost penalty. The flood of Honda's customized models pushed Yamaha out of much of the market, effectively stalling its bid to overtake Honda.[39]

Response Time

To gain a competitive advantage, a company must often respond to customer demands very quickly, whether the transaction is a furniture manufacturer's completion of an order , a bank's processing of a loan application, an automobile manufacturer's delivery of a spare part, or the wait in a supermarket checkout line. We live in a fast-paced society where time is a valuable commodity. Companies that can satisfy customer demands for rapid response build brand loyalty, differentiate their products, and can charge higher prices for products.

Increased speed often lets a company opt for premium pricing, as the mail delivery industry illustrates. The air-express niche of the mail delivery industry is based on the notion that customers are often willing to pay substantially more for overnight express mail than for regular mail. Another exemplar of the value of rapid response is Caterpillar, the manufacturer of heavy-earthmoving equipment, which can deliver a spare part to any location in the world within 24 hours. Downtime for heavy-construction equipment is very costly, so Caterpillar's ability to respond quickly in the event of equipment malfunction is of prime importance to its customers. As a result, many customers have remained loyal to Caterpillar despite the aggressive, low-price competition from Komatsu of Japan.

In general, reducing response time requires: (1) a marketing function that can quickly communicate customer requests to production, (2) production and materials-management functions that can quickly adjust production schedules in response to unanticipated customer demands, and (3) information systems that can help production and marketing in this process.

Table 4.5 summarizes the steps different functions must take if a company is to achieve superior responsiveness to customers. Although marketing plays a critical role in helping a company attain this goal (primarily because it represents the point of contact with the customer), Table 4.5 shows that the other functions also have major roles. Achieving superior responsiveness to customers requires top management to lead in building a customer orientation within the company.

Table 4.5 Primary Roles of Different Functions in Achieving Superior Customer Responsiveness

Value Creation Function	Primary Roles
Infrastructure (leadership)	• Through leadership by example, build a companywide commitment to responsiveness to customers
Production	• Achieve customization through implementation of flexible manufacturing • Achieve rapid response through flexible manufacturing
Marketing	• Know the customer • Communicate customer feedback to appropriate functions
Materials management	• Develop logistics systems capable of responding quickly to unanticipated customer demands (JIT)
R&D	• Bring customers into the product development process
Information systems	• Use Web-based information systems to increase responsiveness to customers
Human resources	• Develop training programs that get employees to think like customers

KEY TERMS

functional-level strategies 111
economies of scale 112
fixed costs 112
diseconomies of scale 113
learning effects 114
experience curve 116
flexible production technology 117
mass customization 118
marketing strategy 120
customer defection 120
just-in-time (JIT) inventory system 122
supply chain management 122
self-managing teams 123
total quality management 127
positioning strategy 133

TAKEAWAYS FOR STRATEGIC MANAGERS

1. A company can increase efficiency through a number of steps: exploiting economies of scale and learning effects; adopting flexible manufacturing technologies; reducing customer defection rates; implementing just-in-time systems; getting the R&D function to design products that are easy to manufacture; upgrading the skills of employees through training; introducing self-managing teams; linking pay to performance; building a companywide commitment to efficiency through strong leadership; and designing structures that facilitate cooperation among different functions in pursuit of efficiency goals.
2. Superior quality can help a company lower its costs, differentiate its product, and charge a premium price.
3. Achieving superior quality demands an organizationwide commitment to quality and a clear focus on the customer. It also requires metrics to measure quality goals and incentives that

emphasize quality; input from employees regarding ways in which quality can be improved; a methodology for tracing defects to their source and correcting the problems that produce them; a rationalization of the company's supply base; cooperation with approved suppliers to implement total quality management programs; products that are designed for ease of manufacturing; and substantial cooperation among functions.
4. The failure rate of new-product introductions is high because of factors such as uncertainty, poor commercialization, poor positioning strategy, slow cycle time, and technological shortsightedness.
5. To achieve superior innovation, a company must build skills in basic and applied research; design good processes for managing development projects; and achieve close integration between the different functions of the company, primarily through the adoption of cross-functional product development teams and partly parallel development processes.
6. Achieving superior customer responsiveness often requires that the company achieve superior efficiency, quality, and innovation.
7. Furthermore, to achieve superior customer responsiveness, a company must also give customers what they want, when they want it. It must ensure a strong customer focus, which can be attained by emphasizing customer focus through leadership; training employees to think like customers; bringing customers into the company through superior market research; customizing products to the unique needs of individual customers or customer groups; and responding quickly to customer demands.

DISCUSSION QUESTIONS

1. How are the four building blocks of competitive advantage related to each other?
2. What role can top management play in helping a company achieve superior efficiency, quality, innovation, and responsiveness to customers?
3. Over time, will the adoption of Six Sigma quality improvement processes give a company a competitive advantage, or will it be required only to achieve parity with competitors?
4. What is the relationship between innovation and competitive advantage?

CLOSING CASE

Amazon.Com

When Jeff Bezos founded Amazon.com in 1995, the online retailer focused just on selling books. Music and videos were soon added to the mix. Today, you can purchase a wide range of media and general-merchandise products from Amazon, which is now the world's largest online retailer, with over $85 billion in annual sales. According to Bezos, Amazon's success is based on three core factors: a relentless focus on delivering value to customers, operating efficiencies, and a willingness to innovate.

Amazon offers customers a much wider selection of merchandise than they can find in a physical store, and does so at a low price. Online shopping and purchasing is made easy with a user-friendly interface, product recommendations, customer wish lists, and a one-click purchasing option for repeat customers. The percentage of traffic that Amazon gets from search engines such as Google has been falling for several years, whereas other online retailers are becoming more dependent on third-party