

## Strategic Analysis

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### What You Will Learn in This Chapter

- How can you use information technology to improve your organization and make it better than your competitors?
- How competitive is your world?
- What are the main factors affecting a firm's competitive advantage? Where do you begin looking for an edge?
- How can you use IT to gain a competitive advantage? Where do you begin your search?
- How can IT support the operations of the firm to provide a competitive advantage?
- Why is it so difficult to convince management to make strategic changes? What are the risks of strategic decisions?
- Why did so many dot-com firms fail? Do their failures mean there is no viable Internet strategy?
- How do you convince an organization to change strategies?
- Can cloud computing provide strategic advantages?

## Delta Air Lines

How can you use information technology to make your company better than your rivals? Delta is one of the original airlines in the United States. Only a handful of the original remain, and most of them, including Delta, are flirting with bankruptcy. Many of the airline executives blame September 11, 2001, the SARS scare of 2002–2003, and the oil price increases of 2003–2004 for their problems. But if you look at revenue and profits over time, it is clear that the big airlines were getting their butts kicked long before these events. In 2005, Delta, Northwest, and Continental were in bankruptcy court—largely to drop their pension plans and renegotiate labor and other contracts. At one point, 50 percent of the U.S. air transportation capacity was operating in bankruptcy. The discount airlines, led by Southwest and joined by Jet-Blue and ATA, have been profitable over the last few years—because they found a way to attract customers and hold down costs.

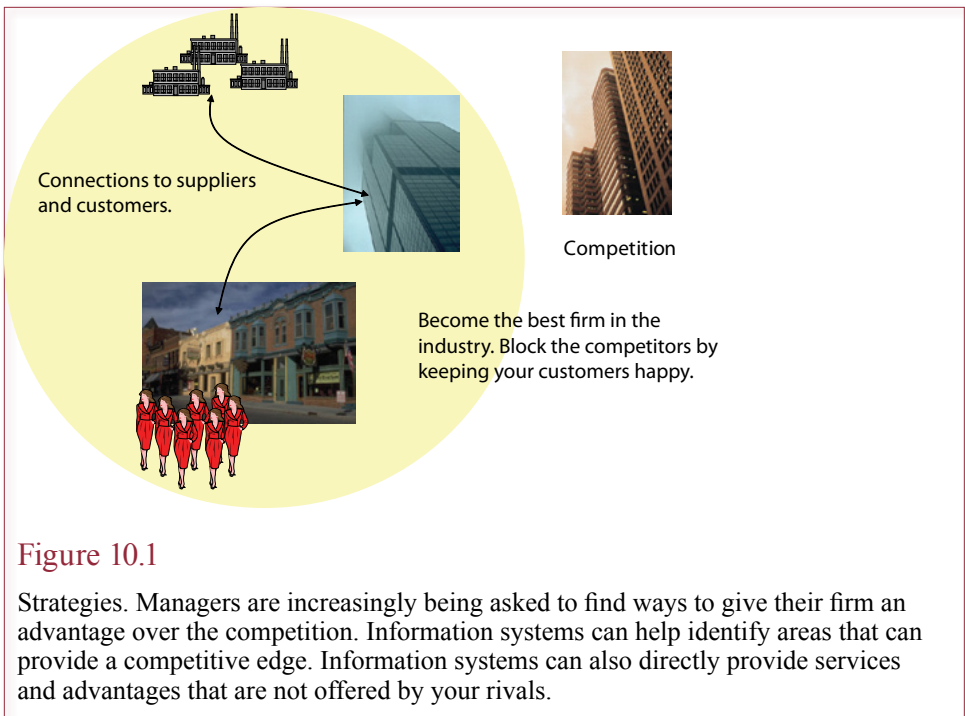
Discounters and upstarts are not new to the airline industry. In a classic case, American Airlines was able to drive away People Express in the early 1980s with its Sabre reservation system. American pioneered yield management—charging everyone on the plane different prices—trying to get as much money from each person as possible, meaning that businesses paid through the nose while tourists who book in advance get cheap seats. The advantage generated from this system was refined with frequent flier miles and kept American, Delta, and the others on top for 15 years. But Southwest, with a radically different strategy, has slowly grown to challenge the entire industry. Is there another rabbit in the hat for the big, traditional airlines? Can Delta find a new way to use information technology to save the day?

## Introduction

**How can you use information technology to improve your organization and make it better than your competitors?** Can technology make your company the best in the industry? These questions are still being debated, but it is clear that in some cases information technology has provided the ability for companies to dramatically change industries. Figure 10.1 shows that technology can be used to build ties to customers and suppliers—effectively making it harder for competitors to enter your market. A key theory from economics (extensively applied in marketing) states that a firm can make additional profits only by blocking new firms from entering the market. And one of the few legal ways to block firms is to differentiate your product so that customers will perceive it as a separate item. Technology can provide differentiating factors including better service, lower prices, stronger customer relationships, and new features for products.

The reengineering provided by information technology creates additional benefits. It enables you to alter the way an organization operates. However, it is critical that you remember that technology by itself is not a magic wand. Now, for the important question: How can you use information technology to find new opportunities and gain a competitive advantage?

Strategy requires looking beyond the internal factors such as costs and implementation details. Managers need to look at the potential effects on customers,



suppliers, competitors, and other external agents. In some cases, the technology can be relatively common—but the trick is to look for additional benefits. For instance, using social networks for marketing uses relatively standard technology, but it requires a marketing staff that understands the products and the customers—supported by custom search engines and data analytics to determine the most important contacts and strongest effects. Using the technology changes the way the company operates. In this example, instead of relying on traditional sales through distributors and retail stores, companies can choose to interact directly with high-profile customers who then affect decisions by other consumers. The real difference with strategy lies in its goal: to change the way the business operates, and gain an advantage over the other firms in the industry.

Information systems can provide a competitive advantage through decreasing costs, improving quality, establishing ties to consumers or suppliers, differentiating products or creating entirely new products. Computer systems can also create barriers to entry through the need for greater technical skills or increased costs.

Designing strategic systems can be a dangerous task with many opportunities to fail. One complication is that development costs are high. Some strategic systems use new technology, which carries higher costs and a greater risk of incompatibilities and other problems. It is also important to remember that attempts to monopolize a market are illegal, and strategic systems can sometimes come close to breaking the antitrust laws.

The most difficult aspect of strategic systems is coming up with ideas that might give you an advantage. Consequently, a related problem is convincing top managers that a potentially radically new, costly idea could actually work. One way to get ideas is to see what firms in other industries have done. You never know when some of the techniques and tricks used by other companies might be useful to you.

### Trends

Ideas and concepts for managing businesses are constantly changing. Many current practices are often traced to Alfred Sloan, who drove the consolidation and expansion of General Motors from 1920 to 1956. Management techniques evolve over time and ideas come from many sources. Through the 1950s, many companies focused on making production more efficient. In the 1950s and 1960s, U.S. firms expanded into wider markets, both nationally and internationally. In the 1970s, managers were preoccupied with the economic changes brought on by oil price rises and consequent shocks of high inflation and high interest rates. The 1970s and 1980s also saw the emergence of increased international competition—for example, between 1960 and 1985, U.S. imports as a percentage of GDP increased from 5.6 percent to 11.5 percent. The 1990s and 2000s saw increasing international competition as well as consolidation among large firms. Many industries now support only a handful of large firms.

Through the 1960s and 1970s, the use of MIS was largely governed by its capabilities and the immediate needs of the organizations. The most common MIS objective was to save money and time by automating transaction-processing tasks. The projects were evaluated on the basis of how much money they could save. Eventually, managers came to realize that computer systems have other advantages. A new technology might enable the firm to provide better service to customers. The company that is the first implementer of a technology might find it easier to attract customers, giving it a competitive advantage over the other firms. For example, the first banks that installed ATMs to provide 24-hour access gained an advantage over their competitors.

Now, everyone uses information technology for transaction processing and some decision-making. Still, new opportunities arise to be a leader, such as connecting to customers through the Web, social networking, and mobile devices. The key is to always look for ways to use new technologies and identify the benefits as well as the costs to find the optimal timing.

## The Competitive Environment

**How competitive is your world?** One of the important trends facing most businesses today is the increased level of competition. As indicated in Figure 10.2, improved telecommunications and faster delivery services mean that local firms face competition from regional, national, and international firms. Local firms have to compete against national mail-order companies, which offer wide selections, next-day delivery, and low prices. The Internet, home shopping channels, and toll-free phone numbers make it easier for consumers to compare prices, putting pressure on all firms.

Large national retailers and franchises put pressure on local stores. They also compete against themselves for market territories. Their size gives them leverage in dealing with manufacturers. By purchasing in large quantities, they can negotiate lower prices. Their high volume also makes it easier for them to buy from foreign producers.

### Reality Bytes: Business Trends

Business statistics indicate a clear trend toward the increased importance of service-oriented firms. Service firms are well suited to certain strategic uses of information systems. In particular, product differentiation, product quality, and new products are typically useful strategies. In many service industries, information is the primary product, so technology is especially valuable.

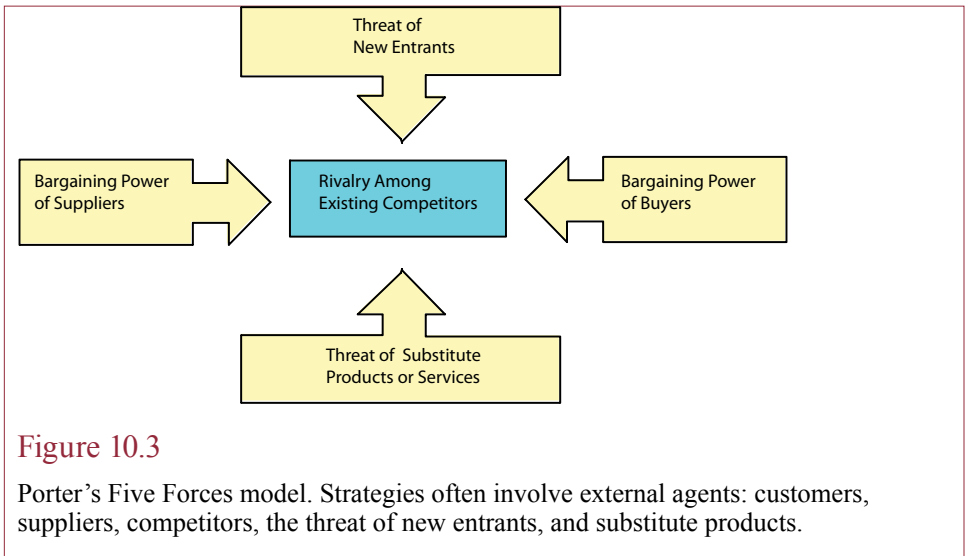
The financial industry provides several strategic examples, such as the Merrill Lynch Cash Management Account, ATMs, or new financial instruments created by brokers. Similarly, Federal Express uses tracking information to differentiate its service from its rivals' offerings. Likewise, the airlines used their reservation systems to give them a competitive advantage in transportation services.

Several international trends are creating increased competition. The international search for lower manufacturing costs puts pressure on firms to cut their costs. For instance, the Japanese have moved production to other Asian nations to build television sets and automobiles. The demographics of an aging population have led Japan from a labor surplus to a labor shortage, and Japan has moved much production to lower-cost nations. Decreasing trade barriers throughout the world also creates larger markets. As eastern European economies rebuild, as the European Union takes shape, and as Chinese, Indian, and Mexican incomes increase, consumers will be able to buy more products. Although the prospect of these increased sales is enticing to U.S. manufacturers, many complications exist. If a competitor becomes established first, it will be a stronger and tougher com-

Figure 10.2

Competition. Even industries with one or two front-runners often have a pack of hungry competitors trying to chase them down. Today's businesses face competitors from around the world.





**Figure 10.3**

Porter's Five Forces model. Strategies often involve external agents: customers, suppliers, competitors, the threat of new entrants, and substitute products.

petitor in the United States. New firms will arise or expand in these international markets, giving them a stronger base to increase sales in the United States, providing for increased competition.

The business world has definitely become more price-competitive in the last decade. Large firms competing on price continually squeeze suppliers to cut costs and offer discounts. Think about the effect of Wal-Mart. How does Wal-Mart continue to decrease costs? Yes, through internal savings, but also through leaning on suppliers. On the other side, the Internet and mobile computing have made it easy for consumers to find price information and compare products instantly. It is easy for consumers to use their cell phones to take a photo of a bar code and receive instant price comparisons, quality ratings, and customer comments. Certainly retailers need to consider the effects of these technologies, but manufacturers must also evaluate the competition in terms of price and quality.

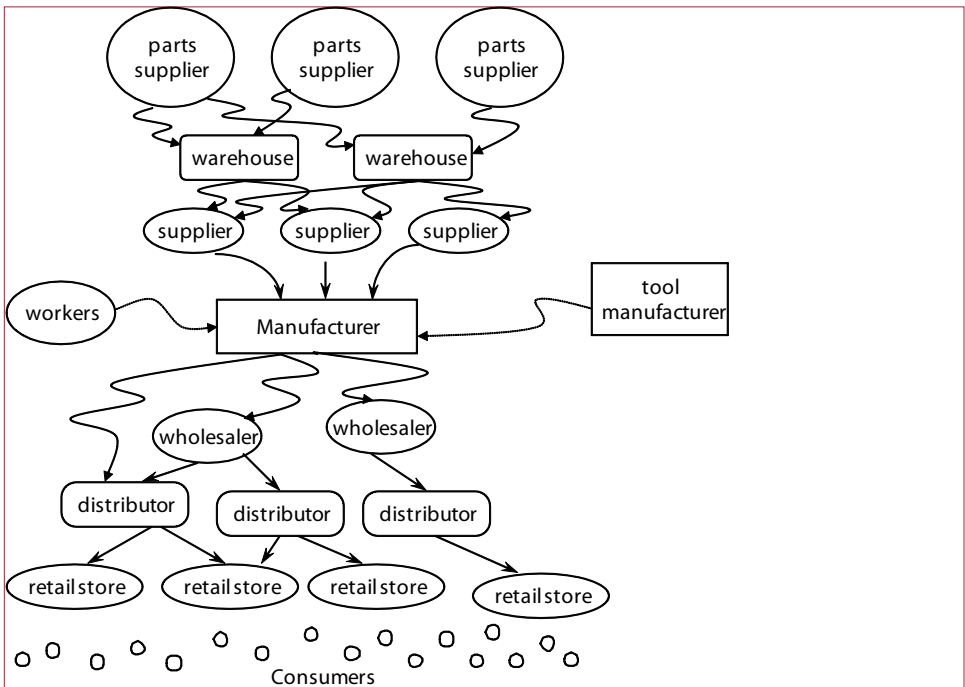
## External Agents

**What are the main factors affecting a firm's competitive advantage? Where do you begin looking for an edge?** Competitive advantage can be gained by establishing or changing relationships between the firm and its **external agents**. External agents consist of suppliers, customers, rivals, potential new entrants, substitute products, and sometimes the government. Figure 10.3 portrays these relationships in Porter's **Five Forces model**. From a systems perspective, each of these entities is outside the control of the firm. Yet they strongly affect the company. Through improved ties to these agents, they become part of your system, which can be used to improve the competitive position of the firm.

### Buyers

Who are your customers? This famous question is used to highlight the issues in an industry. The answer might seem obvious, but many firms have layers of customers. To a retail outlet, customers are likely to be individual people. As shown in Figure 10.4, a large manufacturer might have several levels of customers, ranging from wholesale firms that buy in bulk, then sell to distributors, which deliv-





**Figure 10.4**

Production chain. Modern companies have ties to hundreds or thousands of entities. Sometimes a company will own several pieces of the production chain (vertical integration). Sometimes the company might expand horizontally by building related businesses. Each linkage requires communication and offers the possibility for strategic gain.

er products to retailers, where the final customer purchases the product. Having more intermediate levels between the manufacturer and the customer can make it much harder to manage the firm. It also makes it more difficult to identify the needs of your customers—particularly when information from the various levels conflicts. For instance, an end consumer might want more features, while a retail store might want simpler products and fewer models to reduce stocking problems.

A common strategic goal is to get closer to the customers. Information systems can be used to strengthen the ties among the customers, manufacturers, and various intermediaries. For example, you could build electronic ordering systems, with terminals in the retail stores to capture current sales levels. The systems could also be used to send new product information to the customers, or collect feedback on various attributes, or provide immediate answers to question from retailers and customers.

The issue of buyer's power is critical in Porter's model. For example, if you are a small company selling parts to General Motors, then you have little power in that relationship. So, you will need to look at the supplier side for strategic options.

## Suppliers

Suppliers can provide individual parts, entire products, or even services (such as a bank that lends money). Three major issues involving suppliers are price, quality, and delivery schedules. Just as with customers, problems can arise when many layers of suppliers exist. For instance, increased layers can result in longer delays between ordering and delivery because the supplier has to contact its supplier, who contacts its supplier.

Quality management is also more difficult when there are several layers of suppliers. A fundamental element of **total quality management (TQM)** states that quality must be built into every process and item. Picture the problems that arise if quality is measured only in terms of the output at the manufacturer. When a defective product is found, there is no information about the cause. How can the problem be corrected? Managers need to know where each component came from and evaluate the quality as soon as possible. For instance, if there is a defective product, you could check each component to determine its original manufacturer. The manufacturer could be notified of problems, and you could search other items for similar defects. The manufacturer could use this data to identify problems with individual production lines.

Information systems can be used to build electronic ties to suppliers. Common uses of these systems include placing orders, tracking shipments, monitoring quality control, notifying partners of changes in plans, and making payments. Electronic links provide faster responses, better record keeping, and fewer errors. They also offer the potential strategic benefits described in the next section.

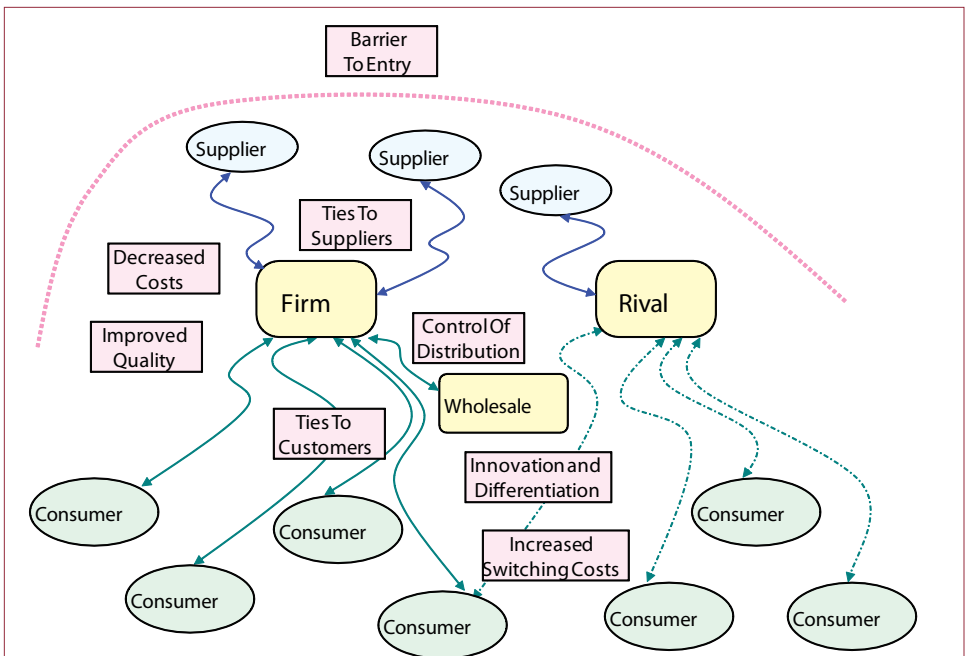
## Rivals, New Entrants, and Substitutes

The goal of a strategic approach is to derive a competitive advantage over the **rivals**, or other firms in the industry. There could be many competitors or just a few larger rivals. The competition could take place in a small town, across a nation, or worldwide. One of the first steps in any strategic analysis is to identify the primary competitors and to assess their strengths and weaknesses. Is the industry rivalry intense with constant price movements and attempts to gain market share? Or do companies rarely adjust prices and are largely content to service existing customers?

One issue to remember about competition is that it never stops. Coming up with one strategic idea is not good enough. For example, American Airlines and United Airlines spent millions of dollars to build reservation systems as strategic systems. Today, all major airlines have access to these systems, and each airline must continually work to improve its system to provide new enticements to customers. Similarly, automobile companies designed computerized diagnostic systems to improve services offered by repair shops. Today, all of the manufacturers have essentially the same systems. In some cases, rivals might offer improvements over your ideas, which will put the originator at a disadvantage. However, the firm that first implements a new strategy can gain recognition and market share. It is important to remember that companies must continually improve and seek new opportunities.

A related issue is the concept of potential competitors or entrants in the business. In some cases, you might identify the major rivals, implement a strategy, and then immediately lose everything as new firms enter your business. Entrants might build their firms from scratch, such as the way Burger King built new stores in the same areas as McDonald's restaurants. Alternatively, other firms





**Figure 10.5**

Methods to gain competitive advantage. Examining the production chain highlights several useful techniques. Barriers to entry keep out potential competitors and substitutes. Ties to suppliers can cut costs, improve quality, and lock out competitors. Control over distribution provides stronger markets and keeps out competitors. Building ties to customers builds loyalty, improves products and increases margins. Creating switching costs keeps customers loyal.

may increase the sales of products that are similar to your products. Substitute products are related economically by the degree to which consumers are willing to use one product instead of the other. A classic example comes from the late 1970s, when the U.S. economy faced high inflation rates and banks were subject to limits on the interest rates they could pay on deposits. Merrill Lynch, the stock brokerage firm, introduced a service enabling customers to store their money in a wide variety of financial instruments that paid significantly higher interest rates than did checking accounts, and still write checks on the account. Many larger customers took their money away from banks and put it in these asset accounts. These new accounts were perceived as close substitutes for traditional bank services, and people transferred huge sums of money out of the banking system.

The key point is that you need to take a broad look at your firm and the industry. Know who your competitors are and how they operate. Are other products or services offered by other industries that might attract your customers? If you make a change in the way you do business, find out how it will affect your rivals. Determine how changes will alter the industry. Will they provide an opening for firms in other industries?

## Government Regulations

In any economy, government intervention has a strong influence on the firm. There are myriad government agencies, regulations, taxes, and reports. The situation multiplies for multinational firms that are subject to the regulations of many nations. These agencies and regulations can have strong effects on the profitability of a firm. Generally, an individual firm has no control over government regulations, but sometimes suggestions can lead to modifications. For instance, it is now possible to submit some documents to government agencies in computer form. In fact, some reports (such as 10K or 10Q financial reports) are required to be filed electronically. Electronic forms can decrease your storage costs and make it easier to find documents that have been stored for long periods of time.

## IS Techniques to Gain Competitive Advantage

**How can you use IT to gain a competitive advantage? Where do you begin your search?** These questions are difficult to answer. Keep in mind that your competitors are asking the same questions every day. Competitive advantage may be achieved with many techniques in business. Information technology is one area that may provide several opportunities. In general, MIS techniques may not be better than other methods. However, some firms have experienced considerable success from using these techniques, so they are well worth considering. Moreover, the rapid changes in technology often lead to competitive advantages if your firm is the first to find a creative use for the new technology. The other side of the coin is that untested new technologies may not work as planned. Hence, the pioneer is taking a risk: If the project fails, the development costs may put the firm at a competitive disadvantage.

The fundamental mechanisms for gaining competitive advantage are barriers to entry, switching costs, lower production costs, product differentiation, control over distribution channels, innovation, and quality control. These techniques are illustrated in Figure 10.5. The question we wish to examine is how information systems can take advantage of these techniques.

### Barriers to Entry

A fundamental concept of economics is that to make extra profits, you need some mechanism to prevent other firms from entering the industry. Otherwise, as soon

#### Figure 10.6

Several methods can build barriers to entry. Be careful. Many attempts to erect barriers are considered illegal under antitrust legislation.

#### Sources of Barriers to Entry

- Economies of scale (size).
- Economies of scope (breadth).
- Product differentiation.
- Capital requirements.
- Cost disadvantages (independent of size).
- Distribution channel access.
- Government policy.

### Reality Bytes: People Express Airlines (Classic Case)

In 1981, Donald Burr's People Express Airlines was the darling of the airline industry and American management. In four years the fledgling airline grew to a \$2 billion company. People Express was cited in *In Search of Excellence* as an ideal American business because of its flat organizational structure and compensation plan that based reward on stock growth. All employees, whether customer representatives or pilots, were viewed as equally valuable to the company. Growth seemed to be unlimited and the airline could not process applications or reservations fast enough. Yet on January 18, 1985, People Express Airlines declared bankruptcy. Soon thereafter, the parts of the empire that Burr constructed were auctioned off and the routes redistributed.

The basic philosophy driving People Express was to make air travel available to everyone. At its peak, People's low fares brought thousands of students, the elderly, and the middle class through Newark, New Jersey. The waits were horrendous and the service was chaotic. Yet the \$29 fare made the hassle worth it, particularly when the other airlines were charging five times as much. People's fares allowed the carrier to book and fly full planes.

As long as the flights were full, the profits were easy to calculate: determine the price of the fuel and the equipment and employee cost per flight of the plane; determine a per flight fare that would provide a profit when the expenses were subtracted; and repeat this formula across the flight pattern. Keep the fares so low that the flight would always be booked. By developing the demand in this new market segment, Burr felt that he had found a formula for success that could not be broken.

This approach looked promising until American Airlines used its Sabre reservation system to implement yield pricing. Through advance ticketing and other restrictions, American was able to discount seats that would have gone unsold because of People's low fares. The flying public now had a choice. They could continue to fly on People Express Airlines and deal with the chaos and the crowds, or they could make reservations and fly on American Airlines with comfort. Besides, they could fly directly and not go through Newark. The remainder of the seats were sold at full price to business people who could not plan far enough ahead to make advance reservations.

People's vision was a good one. It centered on cost cutting and motivating the workforce. Overexpansion and the lack of a marketing focus contributed to the failure of People Express. However, a third major factor was the failure to integrate technology into solving its business problems. Before its first plane left the ground, People Express managers decided not to duplicate American and United Airline's sophisticated reservation systems. Another reason People Express shied away from technological development was that the airline lacked the internal expertise to build or even buy a reservation system. In 1983, the carrier contracted with NCR Corporation to build a system to handle yield management. After 18 months, the project failed. According to Burr, the failure was due to poor communication on both sides and a lack of management attention.

Adapted from Richard Pastore, 1990, Coffee, Tea and a Sales Pitch, *Computerworld*, 7/3/89, p. 1. and Clinton Wilder 1989, Don't Blame the System, *Computerworld*, 7/3/89, p. 42.

as your firm develops a strategy that pays higher returns, other firms will flock to the industry and drive the prices and profits down. Figure 10.6 summarizes the common **barriers to entry**. One way that information systems create barriers to entry is from their cost. Consider what happens when you create a new information system that provides additional services, like banks did with ATMs. Customers soon expect all firms to offer those services. If a new company wishes to enter the industry, it will have to spend additional money to buy the computers and create the systems to offer those services. The information system raises the cost of entering the industry. A classic example of this situation was the introduction of People Express Airlines in 1981. The CEO of People Express stated that he knew the airline needed a reservation system to compete effectively with other airlines, but after raising \$100 million to start the airline, top management found it impossible to raise the additional \$100 million needed to create the reservation system.

As shown in Figure 10.7, computer systems might also be used to create more direct barriers to entry. For instance, as a manufacturer you could build a computer system that is tied to retail stores. The stores would use the system to place orders and to inquire about products, warranties, and delivery schedules. You might be able to forbid the stores from using the system to connect to any other manufacturers. If the stores gain advantages from the new system, they will end up placing more orders from you, and you will keep out potential competitors. However, you will have to be careful not to violate antitrust regulations.

## Distribution Channels

Controlling **distribution channels** is a method of gaining competitive advantage that is similar to creating barriers to entry. The Japanese economy has long been a classic example of controlling distribution channels, although the role of information systems is minimal. In Japan, sales relationships are developed over long periods of time, and companies have many interrelationships and ties. In particular, distribution of products from manufacturers to retailers is controlled by a few large companies that are loosely organized into support groups (*keiretsu*). If you want to sell products in Japan, you must build a relationship with one of these companies. American executives have often complained about the problems they experience in dealing with these distributors, which creates a barrier to selling U.S. products in Japan. Although there is disagreement on the cause of the problems, the ability to control distribution channels can be an effective strategy for maintaining market share and deterring rivals. The distributors gain power through their close personal ties to the customers. For example, in Japan, most new automobiles are sold by salespeople who call on customers at their homes.

Information systems can be used to control distribution channels. As a manufacturer, you could build a computer link to the retail stores. In addition to providing faster ordering and more information, you encourage the store to order directly from your company and avoid competitors. For example, Levi Strauss, the jeans manufacturer, has installed such a system in some retail chains. Assume that you work for a competitor and you call on the retail store to convince the buyers to carry your products. Probably the first question you will be asked is whether the store can order your jeans through the Levi Strauss computer link. If the answer is no, the store manager is going to be less willing to buy your products.

### **Gaining a Competitive Advantage**

#### Barriers to Entry

The additional costs of creating a sophisticated information system make it harder for firms to enter the industry. Classic case: People Express.

#### Distribution Channels

Control over distribution prevents others from entering the industry. Case: iTunes or Napster.

#### Switching Costs

Consumers are reluctant to switch to a competitor if they have to learn a new system or transfer data. Classic Case: Baxter Healthcare.

#### Lower Production Costs

Using technology to become the least-cost producer gives an advantage over the competition. Classic case: Wal-Mart.

#### Product Differentiation

Technology can add new features to a product or create entirely new products that entice consumers. Classic cases: Federal Express and Merrill Lynch.

#### Quality Management

Monitoring production lines and analyzing data are important aspects of quality control. Improving quality leads to more repeat sales. Classic case: Digital Equipment Corp.

#### The Value Chain

Evaluating the entire production process identifies how value is added at each step. Combining steps or acquiring additional stages of the value chain can lead to greater profits. Case: Qwest.

### **Figure 10.7**

Classic cases. Several classic cases illustrate some important methods of acquiring a competitive advantage. Understanding these cases will help you identify potential strategies in other situations. They will also help you communicate with IS professionals.

Now, imagine the confusion that can result for the retail manager who wishes to sell similar products from three companies. What happens if each company has its own private computer link? Does the manager need to have three different computer terminals and learn three different systems?

Partly because of the loss of access to distribution channels and partly because of the confusion resulting from having multiple systems, attempts are being made to standardize some electronic relationships. An important component of electronic data interchange (EDI) is to define standards so that managers have to work with only one system and everyone has reasonable access to that system. If EDI does become standardized, there will be fewer opportunities to control distribution channels with information systems. However, businesses might still be able

to gain a competitive edge by providing better, more sophisticated electronic services through the links. For example, expert systems might be used to provide faster responses to retailer and consumer questions.

One of the interesting aspects of the Internet is its ability to alter traditional distribution channels. In particular, the Internet is becoming the major distribution system for digital data such as music, books, video, software, and news. Some traditional organizations fear this change as a loss of control. For example, in the U.S. music industry, a handful of firms have controlled the production and distribution of most music. In 1998, the firms attempted to stop the expansion of digital music (e.g., MP3 format), but the courts did not support this interference. Consequently, it is now relatively easy for anyone to create music in a commercial format and distribute it cheaply over the Internet. The same industry-altering effects are occurring within the book and news industries. As the number of mobile devices (readers, tablets, and large-screen phones) increases, more people are switching to digital content away from traditional paper.

### Switching Costs

An interesting strategic capability of information systems is their ability to create **switching costs** for your consumers. Consider the case of a brokerage firm that creates a system that enables you to manage your accounts with your personal computer. You buy and sell financial instruments and write checks against your account. The computer automatically tracks your portfolio, notifies you of major changes, and automatically sweeps uninvested cash into interest-bearing assets. At the end of the year, it prints a complete summary of your transactions for tax purposes.

Now, what happens if another broker or bank offers you the same capabilities? Will you switch to a new firm? You might, but it depends on what other incentives the company offers. If everything else is the same, most people would be reluctant to change since they incur costs to switch. For example, you would have to learn how to use the new system. Besides, you would have to reenter your investment data and program new reports and graphs. If you are one of the first firms to create a new system, the deterrence of switching costs can be a powerful tool to maintain

#### Reality Bytes: Control over Distribution

Sony was one of the leaders in designing and selling e-book readers; even before Amazon. Sony has its own digital book store tied into its reader. When the Apple iPad was released, it presented a challenge to Sony and other e-Book readers. Although the display quality is lower on the iPads, it is color, and it is backlit so people can use it at night without a reading light. Sony (like Amazon and Barnes and Noble), created an iPhone/iPad app that enables people to buy books directly from the Sony bookstore. In February 2011, Apple blocked the Sony app. Apple is now insisting that content must be sold through the Apple store instead of inside an application. The reason is not technical—it involves money. Apple takes a 30 percent commission on all sales through its store.

Adapted from Yukari Iwatani Kane and Stu Woo, “Apple Rejects Sony E-Book App,” *The Wall Street Journal*, February 1, 2011.



**Reality Bytes: Merrill Lynch Cash Management Account (Classic Case)**

Until the 1970s, banks and other financial institutions were treated differently by the government than stock brokers such as Merrill Lynch. Financial institutions could not sell stocks, and there were limits on interest rates that could be paid to depositors. Brokerage companies focused on investments in stocks. In this environment, Merrill Lynch created its Cash Management Account (CMA). For a minimum sum of \$25,000, investors could open a new account with Merrill Lynch. The account was similar to a bank account. The money could be placed in risk-free government bonds or it could be used to purchase stocks and bonds. The money could be obtained with minimal problems, including writing checks against the account. In short, the CMA became a bank account for medium and large investors. The primary advantage to the CMA over traditional bank accounts was that there were no government restrictions on the interest rates. As commercial interest rates rose in the late 1970s and early 1980s, huge sums of money left the banking industry and were deposited in the CMA.

Merrill Lynch used its information system to offer additional features, such as automatic transfers between accounts, overnight repurchases and sales of government bonds, and automatic investments and sales of stocks. All the investment options were controlled by individual investors. Banks could not offer these services because of governmental restrictions, and other brokerage firms did not have the information systems. This use of information technology gave an advantage to Merrill Lynch.

While Merrill Lynch was not known for other innovations, it is one of the largest financial institutions in the United States with a balance sheet comparable to Citicorp's. In 1995, the brokerage firm had 44,000 employees and operated in 31 countries. The 1994 profit amounted to 18.6 percent return on equity.

your market share. Figure 10.6 summarizes the tools to create competitive advantages as practiced by companies in the classic cases.

**Lower Production Costs**

In some cases, an effective strategy is to become the lowest-cost producer. If you can consistently sell your product for lower prices than your competitors do, you will have an important advantage. However, consumers need to believe that your products are as good as the competition's.

Computer systems have long been used to decrease costs. Transaction-processing and accounting systems decrease administrative costs. Robots and process-control systems can be used to control manufacturing costs. Inventory systems are used to track parts and reduce inventory ordering and holding costs. Marketing systems might be used to create better target marketing, with the advantages of improved response and lower marketing costs. Financial systems that control investments and cash flow also can result in decreased costs.

**Product Differentiation and New Products**

Another strategic use of information systems is the ability to create new or different products. If you can add features to your product so that consumers believe it is different from the competition, you will be able to make more money. A classic case of using technology to create a new product is portrayed by Merrill Lynch.

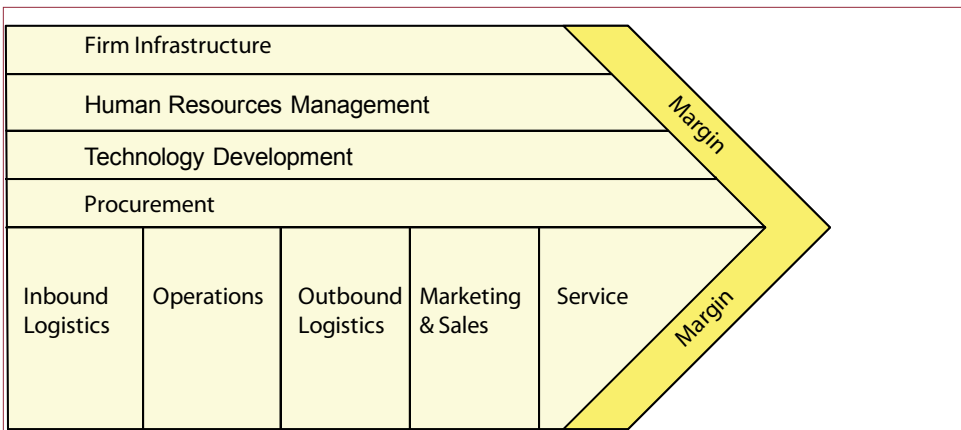
### Reality Bytes: Postal Service Death Spiral?

In many ways, the U.S. Postal Service (USPS) appears to be in a death spiral. The number of users (mail) declines, so the company increases prices to get more revenue, which drives away more customers and the process repeats. In 2010, mail volume declined 3.5 percent from the prior year. However, 170.6 billion pieces is still a lot of mail. For the years 2008, 2009, and 2010, the volume of first class mail fell by 4.8%, 8.6% and 6.6% respectively. Typically, first class mail produces at least half of the revenue. The Post Office eliminated 105,000 jobs and reduced costs by \$9 billion, but still lost \$8.5 billion for the year. The agency asked Congress for permission to eliminate Saturday deliveries—essentially reducing services. The demand for physical shipments has not disappeared, but no one knows how far or how quickly the demand will drop.

Adapted from *The Wall Street Journal*, “Post Office Has \$8.5 Billion Loss,” November 12, 2010.

Another classic case of using information systems to modify a product for competitive advantage came from Federal Express—an overnight package delivery company. Federal Express was the first major delivery company to track individual packages. The service places bar codes on every package and scans them every time the package is moved. By storing this data in a central database, Federal Express employees can tell customers exactly where any package is located. Besides decreasing the number of lost packages, this system provides a new service for customers. Nervous customers can use the information to determine when a package will be delivered. The information system tracks the current location of each package. When the system was created it provided a unique service to customers. To consumers, Federal Express is offering not just package delivery but also information on the location of the package. This **product differentiation** will help attract customers and might allow the company to charge higher prices.

In some cases, information systems can be used to create entirely new products or services. For example, many banks offer sweep accounts to customers who place large sums of money in their bank accounts. Variations exist, but the purpose of a sweep account is to automatically place money into higher-interest-bearing assets. For instance, you might need cash available during the day to cover any withdrawals. But if you do not make major withdrawals at night, the bank could lend your money to someone for overnight use. The bank needs a sophisticated information system to keep track of which customers are participating, monitor what limits they have imposed, and automatically transfer the money to the borrower's accounts. (As a side note, you might wonder who wants to borrow money for just one night. Of the many possibilities, two major players are governments and large banks. Some interesting international possibilities also arise by lending across time zones.) Customers receive more interest, borrowers have access to more funds, and banks make money on the transaction fees and interest rate differentials. These accounts can be provided only by investing in new information systems.



**Figure 10.8**

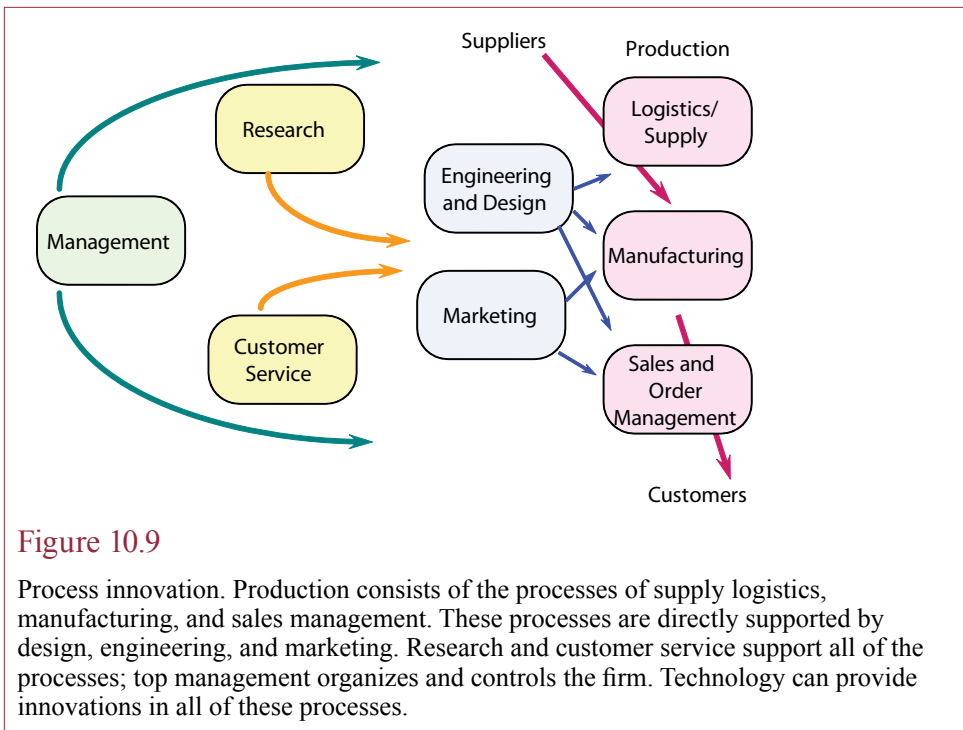
**Value chain.** The value chain illustrates the essential operations in a business. Every firm has operations for purchasing, production, shipping, marketing, and customer service. These processes are supported by the organization of the firm, human resources management, technology development, and procurement services. Providing services desired by customers contributes to the profit margin of the firm.

## Quality Management

Firms can gain a competitive advantage by offering higher-quality products. Through the 1980s, surveys indicated that owners reported fewer problems with automobiles manufactured by Japanese firms compared with those produced by U.S. manufacturers. This difference in quality gave the Japanese firms a competitive advantage. Similarly, Motorola is one of the leading proponents of total quality management. The company is constantly encouraging its suppliers to work at improving quality through the entire manufacturing process.

Information systems have a role in improving quality management. For starters, they can be used to collect data about quality measures. If quality measures come directly from production machines, there can be an overwhelming amount of data. In other cases, quality measures might be collected electronically from your suppliers. Collecting data seems like an obvious idea, but the huge amount of data complicates the process. In many cases, manufacturers have trouble identifying the original source when a component fails. Often, just knowing which suppliers cause the most problems is a useful step in quality management. This data can also help the supplier. Failure data can be used by the supplier to pinpoint the source of problems. Since 1992, nations in the European Union (EU) have been requiring firms to improve quality by complying with the statements in the ISO 9001:2008 (International Organization for Standardization) directive. ISO 9001 requires companies to measure quality at all stages of production. Any firm that wishes to sell products or parts to firms in the EU must build an information system to monitor quality and provide information to customers.

No machine is perfect. There is always an element of error in the output. The difficult part is to determine which errors imply that the machine needs to be readjusted. Decision support systems can be used to improve quality. **Statistical quality control (SQC)** is an important tool. Several statistical calculations and graphs are used to determine whether fluctuations are purely random or represent major changes that need to be corrected.



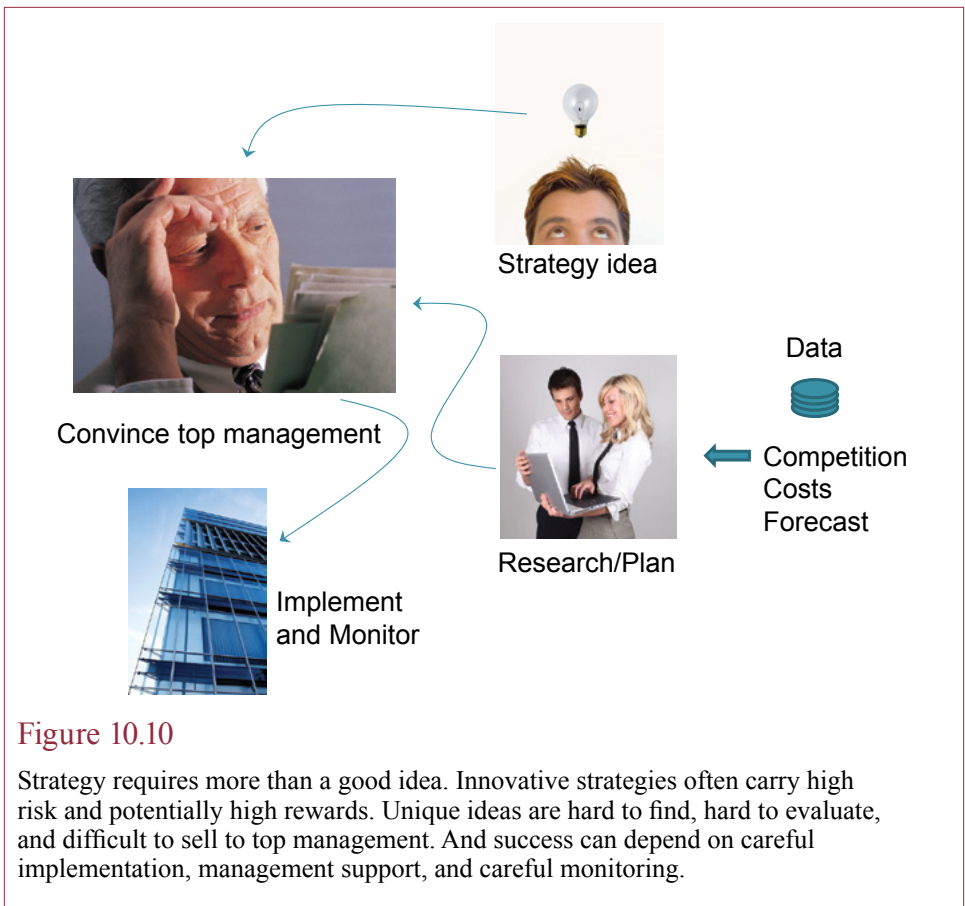
**Figure 10.9**

Process innovation. Production consists of the processes of supply logistics, manufacturing, and sales management. These processes are directly supported by design, engineering, and marketing. Research and customer service support all of the processes; top management organizes and controls the firm. Technology can provide innovations in all of these processes.

Expert systems also can be employed to control errors and locate the source of the problems. Consider a production line that has 50 major machines. In addition, several hundred parts are purchased from external suppliers. The final product has thousands of parts and hundreds of assembly operations. Total quality management requires that quality be monitored at each step of the process. A typical problem facing a machine operator is that a machine might stray off the baseline and need to be corrected. The operator faces several questions, such as: Which adjustment should be made? Should we overcorrect to compensate for the prior errors? Was the problem caused by this machine, or did earlier operations contribute? If corrections are made now, how will they affect other machines down the line? An experienced operator might be able to answer some of these questions. On the other hand, an expert system might be helpful at solving the more complex problems. Digital used expert systems to improve quality and cut the cost of installing minicomputers. Digital's weak performance in the 1990s also illustrates the difficulty in maintaining a competitive advantage as the market changes.

### The Value Chain

One method of searching for areas that might provide you with strategic benefits is to examine the entire **value chain** of the industry. As shown in Figure 10.8, the key feature of a value chain is to examine each step of production and determine how value is added at each step. If some steps show larger increases in value than others, they will be key points to target for strategic action. The second objective of value chain analysis is to encourage decision makers to examine the bigger picture in the industry. In many cases, a firm can benefit by expanding its operations beyond its traditional activities. For instance, an automobile manufacturer (Ford) might buy a car rental agency (Hertz). Now the manufacturer can control a large consumer of its products and control the sale of the used vehicles.



**Figure 10.10**

Strategy requires more than a good idea. Innovative strategies often carry high risk and potentially high rewards. Unique ideas are hard to find, hard to evaluate, and difficult to sell to top management. And success can depend on careful implementation, management support, and careful monitoring.

## The Search for Innovation

**How can IT support the operations of the firm to provide a competitive advantage?** Industry and academic leaders are constantly searching for ways to improve organizations and gain a competitive advantage. Illustrated by Figure 10.9, one method to organize the search is to examine the primary processes of the firm: research, engineering and design, manufacturing, logistics and supply, marketing, sales and order management, service, and general management. Each of these processes has its own inputs, outputs, and objectives. Analyzing them in detail enables managers to spot problems and to search for innovative opportunities.

The following sections present general ideas for each of these processes that have generated interest and some success. Most of them use technology to improve the process or to help the processes work together better. Keep in mind that in any firm, there can be many ways of improving processes. Relying on information technology is not always the best answer.

Just coming up with a new corporate strategy is difficult, but it is not enough. As indicated by Figure 10.10, an effective strategic plan must also describe the changes in the process, identify the new data needs, and describe how the information system will be changed to support the new strategy. Business strategy re-

Area	Information Technology Support
Research	Analysis and modeling, project management, workgroup support, databases, decision support.
Engineering and Design	CAD/CAM, testing, networks, workgroup support.
Manufacturing	Mass customization, links from customers and suppliers, robotics, quality monitoring, expert systems for maintenance, production databases, business integration tools.
Logistics and Supply	Just-in-time linkages, forecasts, models, links for design, transaction processing.
Marketing	Frequent buyer databases, target market and media analysis, survey design and analysis, multimedia promotion design, links between customers and design teams.
Sales and Orders	Portable computers for salesperson contact, expert systems for order customization and configuration, workgroup tools for customer support.
Service	Phone support systems, location monitoring and scheduling of service people, expert system diagnostics, databases.
Management	Enterprise information systems, links to service providers (accountants, consultants, etc.), e-mail, bulletin boards, decision support systems, personal productivity tools, workgroup support.

**Figure 10.11**

The search for innovation. Information technology provides many opportunities for improving the fundamental business processes. IT is used to improve communication, decrease costs, reduce design times, monitor customers and rivals, and improve customer service.

quires more study than can be provided in this book. Several books and courses study the various techniques for analyzing businesses and searching for new business strategies. The key is that the executive analysis should include an awareness of the opportunities provided by information systems. Also, the information system strategic plan needs to adapt to the organization's strategies.

It is easier to understand the strategic possibilities of IT by looking at the specific organization functions. In most situations, you will examine the organization in detail, and search for ways to apply technology to operations and support functions. Figure 10.11 summarizes the capabilities of IT to support innovation. All of these technologies are discussed in this book. The difference now is that you are specifically searching for new ways to improve an organization. All of these methods have been used in other organizations to support the various areas. Some organizations use many of these tools, others only a few. Some technologies are well-established and would hardly count as strategic in some organizations today. But, the point of the table is to summarize the possibilities to help ensure you do not overlook them in your search for ideas.

## Research

Research in firms varies enormously depending on the industry and the overall corporate strategy. At a minimum, most firms at least have a product development



team that is constantly searching for new products or improvements in existing products. Some companies, such as 3M, DuPont, Microsoft, and Intel, spend considerable sums of money on basic research to create entirely new products. To these firms, strategic advantage comes from being the leader in the industry with a constant cycle of new products.

IT support for research takes the form of computer analysis and modeling, statistical analysis of data, project management and budgeting, and workgroup technologies that make it easy for researchers to collaborate and share information with each other and with managers throughout the company. Data mining, business intelligence, and neural network tools can also be useful for exploring and analyzing research results. For example, many experiments in chemistry and physical sciences can be monitored and summarized by automated equipment.

## Engineering and Design

Engineering and design processes are responsible for converting theoretical research into new products. Engineers establish manufacturing procedures, design new equipment, and coordinate suppliers with production. In particular, the design process must optimize the production line to minimize costs and retain high quality.

Support for engineering and design takes the form of CAD/CAM systems that make it easy to create, modify, store, and share new designs. If these systems are coupled to integrated design databases, engineers can more easily reuse prior results. Tying into production databases enables the engineers to model and test various aspects of their designs. Engineers can also be supported with expert systems that help them analyze production aspects of their designs. As General Motors engineers design new cars, software helps them improve the layout to simplify production and to use existing components. Engineers are also being supported by workgroup technologies that make it easy to share designs and receive input from teams of workers throughout the company.

## Manufacturing

Four key features are critical in production: costs, speed or timing, quality, and flexibility. Competing through lower costs and higher quality are time-honored means of gaining a competitive advantage. It might not be sufficient today. Increasingly, firms are turning to **mass customization** in an attempt to gain market share. Twenty or thirty years ago, the large firms in an industry were content to build huge plants, gain economies of scale, and aim at the mass market. This approach tended to leave niches open for competing firms. The problem with this strategy is that it allows rival firms to gain a toehold, which they might use to build market share and eventually compete directly against your primary market. Today's firms are trying to shift production fast enough so that they can cover virtually all of the niche markets.

Mass customization requires an IT system that links the sales system directly to the production line and through to supply. It also involves heavy use of robotics that are configurable directly from one computer. Other uses of IT include expert systems for maintenance and diagnostics. Japanese firms have long been proponents of preventive maintenance. If you wait until a machine breaks, it is too late. Expert systems can be used to schedule routine maintenance and spot problems before they cause problems. IT systems are also heavily used to monitor quality and suggest improvements.

### **Reality Bytes: Artists Without Labels**

Information technology has made huge leaps in the past few decades and companies have spent billions of dollars on hardware, software, and personnel. But, do companies actually gain anything from all this technology? This question is challenging to answer because of the complexity of companies and technology. One answer comes from the MIT Center for Digital Business that worked with McKinsey & Co to survey 330 U.S. public companies. An important conclusion of the study was that companies that used data and analytical tools to make decisions (instead of guesswork) had four percent higher productivity and six percent higher profits than the average. Another interesting result is that many firms are not using the technology as much as they could be.

Adapted from Andrew McAfee and Erik Brynjolfsson, “What Makes a Company Good at IT?” *The Wall Street Journal*, April 25, 2011.

### **Logistics and Supply**

The implementation of just-in-time (JIT) inventory systems is largely credited to Japanese manufacturers. Today they are used by manufacturers worldwide. Manufacturers attempt to cut costs by holding minimal inventories. Instead, inventories are maintained by the suppliers, who deliver the products to the assembly line just as they are needed. The system can work only if the suppliers and factories are linked electronically—often there is only a one- or two-hour delay between ordering and delivery.

Suppliers are often involved in the design phase. Their knowledge is useful in identifying supply availability, costs, and substitutability of components. Sometimes, it is difficult to locate suppliers for equipment. Computer networks such as IndustryNet help firms connect with potential suppliers and identify equipment, parts, and prices.

### **Marketing**

A well-known application of IT to improve marketing is the use of frequent-buyer databases that identify major customers. More traditional point-of-sale transaction systems can be leveraged by identifying preferences and rapidly spotting patterns or trends. At the tactical level, expert systems are used to help analyze data and perform statistical trend analysis. Geographic information systems are being used by leading firms to identify patterns and possibilities for new sales. Information systems can also be used to link firms more closely to external marketing firms for research data, communication, and development of promotional materials.

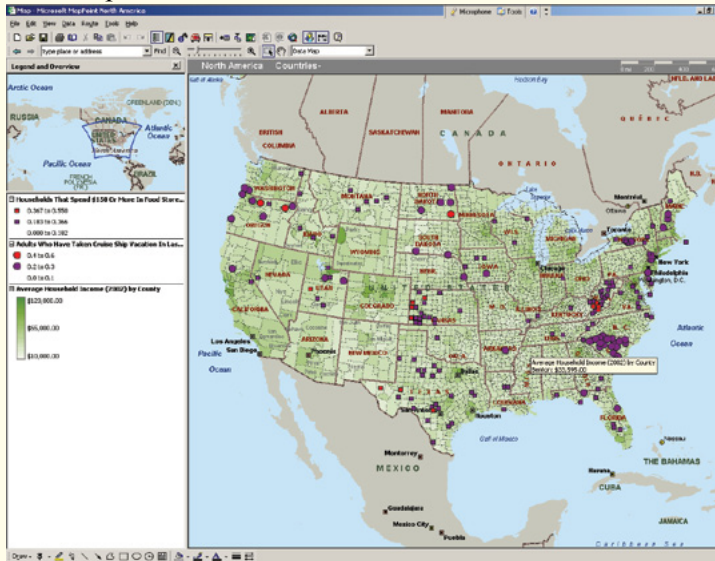
Multimedia tools are being used by leading firms to develop initial ideas for advertising and promotional campaigns. Companies such as General Motors are also using video tools and computer dissemination of video to link customers and marketing departments closer to the design team.

Social networking is an increasingly important marketing channel in many firms. If nothing else, it is important to monitor the Web for comments about your company—both to gain information and to help stop bad comments as quickly as possible. Finding ways to gather, evaluate, and leverage consumer information is critical to success in marketing.

## Technology Toolbox: Locating Customers with a GIS

**Problem:** You need to identify locations and characteristics of your customers.

**Tools:** A geographic information system (GIS) helps you analyze and display relationships based on location. ESRI's ArcInfo and Microsoft's MapPoint are two



leading products for displaying overlays of geographical information. ArcInfo is relatively expensive, but is widely used for large projects. MapPoint is not included with Office, but is affordable and demonstration copies are available. GIS software is designed to display basic maps, showing boundaries and major infrastructure items such

as roads and rivers. You can choose the level of detail you want to see by zooming in or out. The critical feature of a GIS is the ability to display geo-coded data. Data is usually displayed using shading or different circles or other icons. You can also overlay pie or bar charts in each location, but you need to keep the number of charts relatively low to remain readable.

To further refine your strategies, you can add your own data, such as sales, factories, or competitor locations. Advanced systems also provide optimization routines that help select distribution routes.

One of the greatest strengths of a GIS is the ability to persuade others. Even if you already know the general relationships, a map is a powerful tool to convince executives. Instead of reading through pages of data, they can quickly see the spatial relationships on the map.

### Quick Quiz:

1. How often does the U.S. Census Bureau update its data?
2. Why is location an important element in business decisions?
3. How many location-based pie charts do you think could be placed on a map?

## Sales and Order Management

Sales and order management are often handled simply as an operations or transaction-processing area. However, in the last 10 years, several firms have used technology to gain a competitive advantage by improving the way they handle sales and orders. Frito-Lay's use of handheld computers is a classic example. The systems enable managers to more closely track their own sales, sales of competitors, and other external factors, because salespeople can enter data immediately. For certain industries, the concept can be extended further to installing workstations at the customer sites that tap into your central databases. Federal Express and Baxter Healthcare both used this technology to gain a leadership position.

Leading firms are also using expert systems to assist customers in choosing the products and options that best match their needs. These systems assist order takers and improve sales by matching customer needs. Expert systems are similarly used to improve configuration and shipping.

Workgroup technologies, e-mail, and expert systems all combine to give more power to the frontline workers dealing directly with customers. Resolving problems and meeting customer needs faster improve customer satisfaction and cut costs.

## Service

Service industries and service-based processes (like accounting, MIS, and law) have their own problems and opportunities. Technology is used to support services with on-site, portable computers. These systems enable workers to have complete access to information almost anywhere in the world. Leading companies are building specialized databases to support their service workers, such as the "answer line" databases that support General Electric and Whirlpool customer service representatives.

Systems are built that monitor locations of service personnel, enabling firms to identify the closest workers to problems and to fine-tune schedules throughout the day. Complex products are increasingly being sold with internal diagnostic systems that automatically notify service departments. Similarly, companies are cutting costs and reducing repair time by building expert systems to diagnose problems.

## Management

One of the more dramatic IT support mechanisms for management is an executive information system. Giving top managers better access to data allows them to identify and correct problems faster. More sophisticated models can be built to examine alternatives—especially to analyze the potential reactions of rivals in a competitive situation.

Larger firms are building electronic links to their strategic partners, for instance, by providing electronic access to corporate data to accounting and legal firms. These links enable the external partners to keep a closer eye on the firm, speeding the identification of problems and assisting them in spotting broad patterns and opportunities.

Executives are also increasingly turning to electronic conferencing tools and workgroup software, even e-mail. Executives can cover more areas and deal with more people with these systems than they can by phone or through face-to-face contact. Some studies have shown that, in traditional conversations, managers spend as much as 50 percent of the time on personal chitchat. Electronic systems

Strategy	Skills & Resources Required	Organizational Requirements	Risks
Differentiation	<ul style="list-style-type: none"> <li>• Strong marketing.</li> <li>• Product engineering.</li> <li>• Basic research skills.</li> <li>• Distribution channel acceptance and cooperation.</li> </ul>	<ul style="list-style-type: none"> <li>• Internal coordination, R&amp;D, production, and marketing.</li> <li>• Incentives for innovation.</li> <li>• Resources to attract creative and skilled labor.</li> </ul>	<ul style="list-style-type: none"> <li>• Competitors imitate.</li> <li>• Customers do not accept differences.</li> <li>• Cost is too high.</li> </ul>
Cost Leadership	<ul style="list-style-type: none"> <li>• Continued capital investment.</li> <li>• Process engineering.</li> <li>• Continuous quality improvement.</li> <li>• Tight supervision of labor and costs.</li> <li>• Products designed for low-cost production.</li> <li>• Low-cost distribution.</li> </ul>	<ul style="list-style-type: none"> <li>• Tight cost control.</li> <li>• Frequent, detailed cost reports.</li> <li>• Highly structured organization.</li> <li>• Incentives based on quantitative measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Competitors imitate.</li> <li>• Technology changes.</li> <li>• Lose production or distribution advantage.</li> </ul>
Customer-Supplier Links	<ul style="list-style-type: none"> <li>• Influence with partners.</li> <li>• Communication channels.</li> <li>• Standards or agreements.</li> </ul>	<ul style="list-style-type: none"> <li>• Flexibility to respond to customers.</li> <li>• Service culture.</li> <li>• Ability to adapt to emergencies.</li> </ul>	<ul style="list-style-type: none"> <li>• Security threats.</li> <li>• Changing standards.</li> <li>• Competitors copy with more links.</li> </ul>

**Figure 10.12**

Implementing strategy can be difficult, costly, and time consuming. Firms generally choose one primary strategy and then build the resources and shape the organization to best support that strategy.

(although they might be less personal) tend to be more efficient. On the other hand, some companies have been restricting employee access to electronic networks (especially the Internet) because they waste too much time on personal communications.

Another approach taken by management is the move toward standardization: the effort to make all jobs similar, routine, and interchangeable. By reducing jobs to their most basic level, they become easier to control and easier to support or replace with information technology. Franchises make good use of this concept. At the same time, management jobs in some companies are being reformulated as teams of knowledge workers. In the past, managers worked on fixed tasks within the corporate hierarchy. Today, you are more likely to be hired for your specific skills and knowledge. As the needs of the company change, you will work with different teams at solving problems and creating new products and services. Personal computers and client-server technologies are often used to support these management teams. Instead of relying on one central computing facility, each team has its own set of resources, which are shared over networks throughout the company.



Figure 10.13

Dangers of strategy. When developing and choosing strategies, you must always remember that innovations can be risky and often carry high capital costs. Although it may be exciting to spend millions of dollars on technology, it can destroy the firm if you do not have enough resources to support research and operations.

## Costs and Dangers of Strategies

**Why is it so difficult to convince management to make strategic changes? What are the risks of strategic decisions?** Strategic uses of information systems can be seductive. There are many interesting cases in which companies have created innovative information systems. Inventing strategic alternatives requires a considerable amount of creativity. It is easy to get caught up in the excitement of designing new approaches and to forget about the risks. Evaluation of any project requires weighing the risks against the potential gains. Although it is often difficult to measure the potential gains and risks, it is important to consider all consequences. By their nature, strategic changes can alter the entire course of the firm. Figure 10.12 summarizes the skills, organizational effects, and risks involved with several strategies.

Robert Morison and Kirtland Mead (“A Hard Look at Strategic Systems” 1989) pointed out that it is easy to misinterpret the various classic cases regarding strategic use of technology. For example, in many cases, the true strategy does not lie in the computer system; instead, the gains came from changing the way the business operates. For instance, the gains experienced by American Hospital Supply (Baxter Healthcare) came about because they improved the way their customers (hospitals) handled supplies and inventory. The computer system facilitated this change but was not necessarily responsible for it. In other words, rather than search for a killer strategic computer system, it is wiser to identify ways to improve the overall business, then ask how technology will support that change.

### High Capital Costs

One of the important considerations in strategic analysis is the cost. Strategic changes often involve implementing new technology before any of your competitors. Yet new technology tends to carry high costs. Manufacturers of technology may not have reached economies of scale, and they might have monopoly power over prices through patent rights. Furthermore the IS teams will have less experience with the technology, so it will take longer to implement and may result in



missteps and require additional testing. For instance, Morison and Mead (1989) report that “it took six years and \$350 million before American Airlines’ Sabre travel agency reservation system started paying off.” As Figure 10.13 implies, these costs might take away money from other projects.

It can be difficult to estimate the cost of major projects, especially when they involve new technologies. There are many examples of MIS projects going over budget and beyond deadlines. Moreover, strategic projects often require major capital outlays up front, but increased revenues do not appear until much later.

A big question with new technology is trying to decide when it should be implemented. There is an inherent conflict. If you offer an innovative service from the technology before your competitors, you can gain a competitive advantage. However, if you wait, the costs will be lower. In making this decision, you will also have to guess what action your competitors will take.

### When the Competition Follows

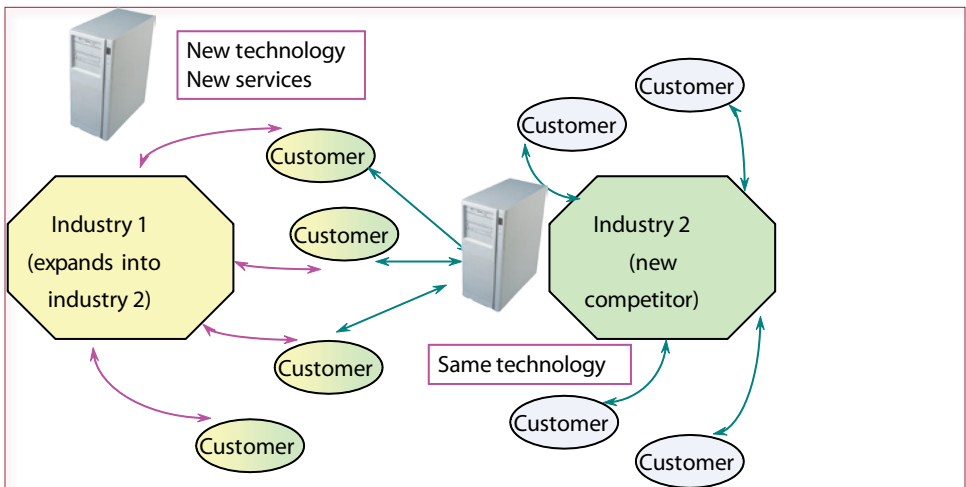
Another difficulty with strategic systems is that much of the advantage comes from creating a service that is not offered by your rivals. Once you introduce the service, your rivals will watch the customer response closely. If the customers begin to switch to your firm, your rivals will undoubtedly create a system to offer the same services. At that point, you lose most of the competitive advantage. Even worse, you might end up with an escalating “war” of technology. Although the competition is good for the customer, the increased expenditures can cause problems for the company if the ideas do not work as well as you expected. In this aspect, strategy is similar to chess: you must plan for multiple moves ahead of time.

The gains to technology occur from when you first implement the strategy to the point that your rivals follow. For example, almost all of the major overnight delivery services now provide the ability to track shipments. If the system is easy to create, you may not gain much. However, it is likely that customers who switched to your firm will stay, so you can gain a larger share of the market.

On the other hand, if your strategic ideas do not pay off, your rivals will gain, because you will likely lose most of the money invested in the project. Some firms use this tactic to great advantage, by using a fast-follower strategy. They allow smaller firms to take the risk and experiment with new technologies. If the project succeeds, the large firm steps in with more money and more clout and creates its own, improved version. About the only risk it takes is that the smaller firm might become successful enough to grab a serious share of the market. But, if the large firm is big enough, it can often buy out the smaller rival and integrate the technology with minimal risk.

### Changing Industry

An intriguing problem that can arise is that even if your strategic project succeeds, the company might lose because your project has changed the industry. Consider an insurance company that sells software to companies to allow them to track insurance deductions and payments to workers. The insurance company decides that it can add a program to compute payroll, so the companies could drop their existing payroll software. These features appear to give the company an edge over its rivals in the insurance industry. The problem is that there are many more companies that create payroll software, and one of them is an 800-pound gorilla (ADP). It is relatively easy for these payroll companies to add insurance capabilities to their existing software. The actions of the insurance company encourage



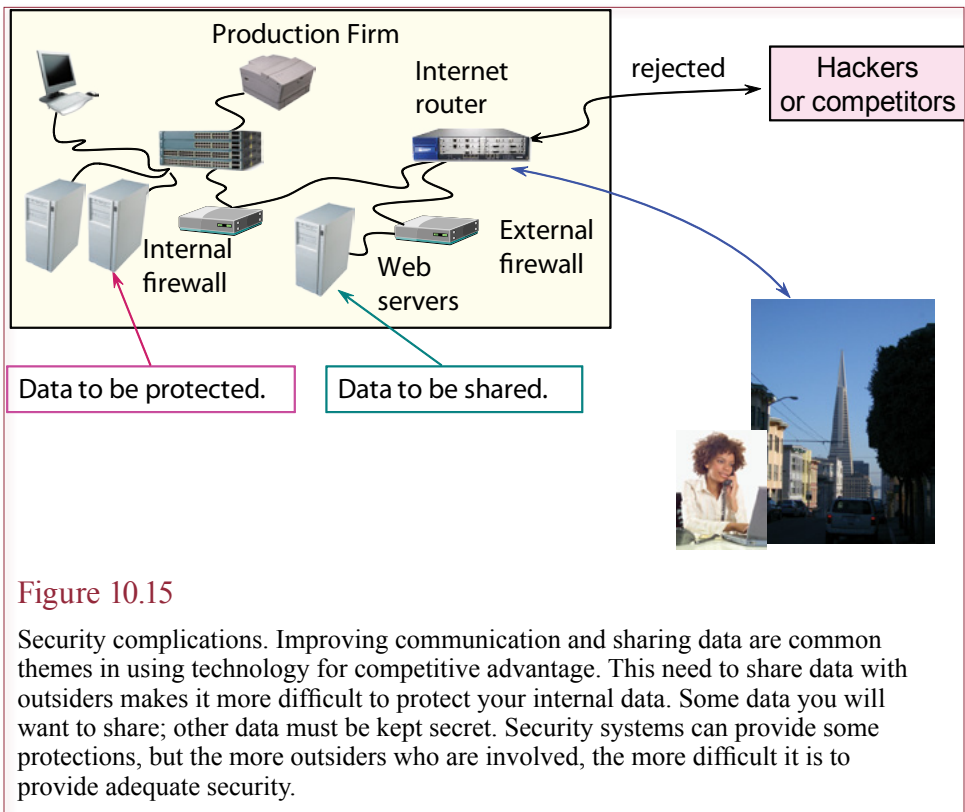
**Figure 10.14**

Changing industry and government intervention. A complication with strategy is that it might alter the industry. A firm in Industry 1 might use IT to attract customers from a different industry. Because of this expansion, the firm gains new competitors (from Industry 2). While competition is often beneficial, you must thoroughly analyze the effect of the new competition before embarking on changing the industry. In a related manner, sometimes changes in government regulations alter relationships between industries, as in the telephone and cable TV markets.

the payroll software firms to move into the insurance market. As illustrated in Figure 10.14, the insurance company suddenly has hundreds of new competitors and could lose customers.

### Sharing Data

One common technique in strategic systems is to share your data with customers and suppliers. Two questions arise from this situation. First, do you really want suppliers and customers to have access to the data? Second, can you control their access to protect other data? Security and control issues are examined in detail in Chapter 5. The main point to think about here is what might happen as your customers gain access to your data. The process of protecting the rest of your data becomes more complex. Consider the situation of a supplier to General Motors. To save costs and improve communications, GM wants you to connect your computer to the GM factory computers. GM intends to use the links to place orders, monitor quality data, and track shipments. Are you willing to give GM access to your computer? Can you control the information that the large corporation is allowed to see? Maybe when checking on their orders, GM will also be able to determine how much you are producing for other companies. Or maybe GM will gain access to your supplier lists and raw material prices. Even if the GM managers are ethical and do not reveal this data to anyone else, you still might worry. What happens when you have to negotiate prices with GM the next time? If the corporation has access to your data, you might be concerned that it could influence the negotiations. Figure 10.15 illustrates the need for security systems that will enable you to control the access to your data.



**Figure 10.15**

Security complications. Improving communication and sharing data are common themes in using technology for competitive advantage. This need to share data with outsiders makes it more difficult to protect your internal data. Some data you will want to share; other data must be kept secret. Security systems can provide some protections, but the more outsiders who are involved, the more difficult it is to provide adequate security.

## Government Intervention

You have to be careful when considering strategic maneuvers. Many potential strategies violate **antitrust laws**. For example, many barriers to entry are illegal, as is price discrimination. In fact, attempts to monopolize a market are forbidden by the Sherman Antitrust Act. Price fixing and other forms of collusion are also outlawed. Information system agreements between competitors could be scrutinized by the Justice Department or the Federal Trade Commission. More recently, the European Union has become a major player in evaluating mergers and antitrust complaints. Even if a company is largely based in the U.S., major sales in the European Union can make the company subject to European rules and procedures.

If government agents choose strict interpretations of the laws, it could complicate many information system issues. For instance, firms might be discouraged from forming consortiums that define standards. Agreements to share disaster backup facilities might be outlawed. Computer links to customers might be seen as limiting competition. So far, the U.S. agencies have allowed all of these activities to proceed without interference. However, there is always the chance that other nations or different political administrations will view the issues differently.

From the 1980s through the 2000s, the government was relatively lenient about antitrust issues, including those regarding information systems. However, one interesting case arose with the airline reservation systems. For many years, American Airlines and United Airlines had the leading reservation systems. Other airlines could list flights on the systems, but they had to pay money for each ticket sold through the system. A conflict eventually arose because the airlines

### Reality Bytes: Borders Battles for Life

Borders Group is the second largest bookstore chain in America, behind Barnes and Noble; and not counting Amazon. The switch from print books to digital caught Borders flat-footed. The company was late to the digital marketplace. Borders purchased a stake in Kobo Inc., a Canadian e-book retailer, and launched an online bookstore in mid-2010. Albert Greco, a researcher of the book industry estimated that in 2009 Borders had a 10 percent share of the retail book market. Borders said that it hoped to control about 17 percent of the e-book market by mid-2011. In early 2011, Borders began closing many of its retail stores.

Adapted from Jeffrey A. Trachtenberg, “Borders Group Launches e-Book Store,” *The Wall Street Journal*, July 7, 2010.

that created the system programmed it to list their flights first. Flights from other airlines were often listed on separate screens, so travel agents and customers were encouraged to choose flights from the airline that built the system. Although this mechanism did not directly violate antitrust laws, Congress decided to pass a new law, making the practice illegal. Lawmakers decided that as long as the other airlines had to pay for access to the system, everyone should have an equal chance at being listed first. The point is that even though the initial action was not illegal, Congress has the ability to pass new laws and remove the advantages, so you cannot assume that the benefits will last.

## The Role of Economics

**Why did so many dot-com firms fail? Do their failures mean there is no viable Internet strategy?** The main lesson from the failures of the early dot-com firms in 2000 and 2001 is that no matter what anyone tries to tell you, to succeed in business, you must make a profit on operations. The second lesson is that it takes time to acquire loyal customers—longer if you want to change the world. Many of the early e-commerce managers felt that to become the dominant player, they had to be the first and biggest firm. So their primary strategy was to sell products below cost and spend huge amounts of money on national advertising. The advertising was successful at attracting investors, whose cash kept the firms alive for a year or so. But when the sales failed to generate profits, there was no way to keep the companies running.

The advertising strategy also created an interesting domino effect in the early industry. By pushing the importance of name recognition (and a good domain name), many of the early firms were able to survive by attracting advertising money from other firms. For example, Excite was a leading Web-portal firm. With its easy name and relatively popular search engine, many people used the site on a regular basis. Based on the number of people visiting the site (known as eyeballs), Excite was able to sell advertising space on its pages to other Web firms. Over 80 percent of Excite’s revenue came from advertising. As the other firms in the industry fell apart, they stopped their advertising spending and Excite’s revenue plummeted. Many other firms faced the same problem, and the chain reaction caused hundreds of firms to fail.

Clearly, Web sales and Web advertising are here to stay. Many firms make money from sales of products, services, and advertising. Yet, many firms still face dif-

difficult decisions about how to draw those lines. The newspaper industry is one that is facing difficult questions. In the early days, many magazines and newspapers attempted to charge for access to their sites. Gradually, most of them dropped subscriptions and relied on advertising revenue as well as sales of traditional paper-based versions. A notable exception was *The Wall Street Journal* which focused on creating quality content for a fee—even online. But, as print subscriptions dwindled, newspapers began creating “pay walls” where people had to subscribe to see content online. The situation is an interesting strategic problem—which could mean life or death for many companies. The challenge is that to sell online advertising, the sites need to attract a large number of unique visitors. But, charging for content has the potential to drive away readers who will be inclined to find free resources. So, a newspaper would lose money from advertising and not gain much money through subscriptions. Yet, if print subscriptions and print advertising continue to dwindle, how can a newspaper cover its costs?

Television and radio stations have been able to survive on the basis of advertising revenue. Some Web sites (notably Google), became wealthy through advertising. But, is there room for thousands or millions of sites to succeed based solely on advertising?

The strategic options in e-business are increasing as new tools are created, wireless capabilities improve, and people begin to adopt connectivity as a way of life. At this point, there is no single answer, which makes it even more important that you carefully define your goals, analyze the profits, evaluate your competition, and build a creative business plan.

## Challenges of Strategy

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**How do you convince an organization to change strategies?** This question is probably the most difficult question any upper-level manager will face. Even when you join an organization in an entry-level management position, you will quickly see the challenges presented to new ideas. Most people and almost all organizations resist change. Organizations develop a method of operating that works. It might not be the perfect answer, but it was developed over many years and hardened through experience and competition. The method must have been reasonably successful or the company would not have survived. But, is it the right strategy for the future? And, if you think you have a new strategy, how will you convince people to adopt it. Keep in mind that new strategies cost money and an organization usually faces multiple options for strategies. How can you prove your ideas have merit and will work? The challenge is even higher if the risk of failure is a large loss or a loss in market share.

Information technology solutions can be even harder to sell to top management. Few managers truly understand technology. Most have experienced problems with technology failures—particularly leading edge technologies. Most large companies have encountered the delays and frustrations of trying to develop and implement new technologies. Managers have become cautious about being the first organization to try new technologies. Managers also know that the price of new technology is often high and tends to decline rapidly. Being the first person to adopt new hardware usually means that you are paying more money than anyone else. Consequently, many people choose to wait and see which technologies will succeed and wait for the price to drop to levels that reduce the risk.

### Technology Toolbox: Analyzing Businesses

**Problem:** You are presented with a business problem to solve.

**Tools:** You need an analytical methodology to evaluate the problem, focus on the causes, and identify appropriate solutions. If the situation is based on business processes, you can use the data flow diagram techniques to show how the firm is organized and how data is supposed to move. Because it is a graphical approach, it is good for spotting the cause of problems and for communicating relationships to others. You can also adapt database and object-oriented tools to help you understand design details for data-intensive problems. Ultimately, every manager needs to develop a methodology for approaching business problems and cases. When you encounter a new situation, where do you start?

Foundation	Business Plan	Expectations
Solve the right problem Choose the right tools Divide the system Make a decision Consider the consequences Detail the implementation	Problem description State facts and problems. Identify most important problems and causes. Plan Describe the new system. Detail how to implement the plan. Provide a contingency plan. Advantages Show how your plan will solve the problems. List additional advantages and strategic effects.	Measurable goals Financial implications Effect on human resources Strategic effects Critical success factors Potential risks

The important first step is to solve the right problem. Most businesses encounter multiple problems. Often, you see only the symptoms, and you need to trace back to the cause. This work requires detective and diagnostic skills—which are usually acquired through experience with cases and real-world problems. Once you have identified the root problems, you have to choose the correct tools. There is an old saying: When all you have is a hammer, everything looks like a nail. Make sure you examine all of the available tools before pounding away.

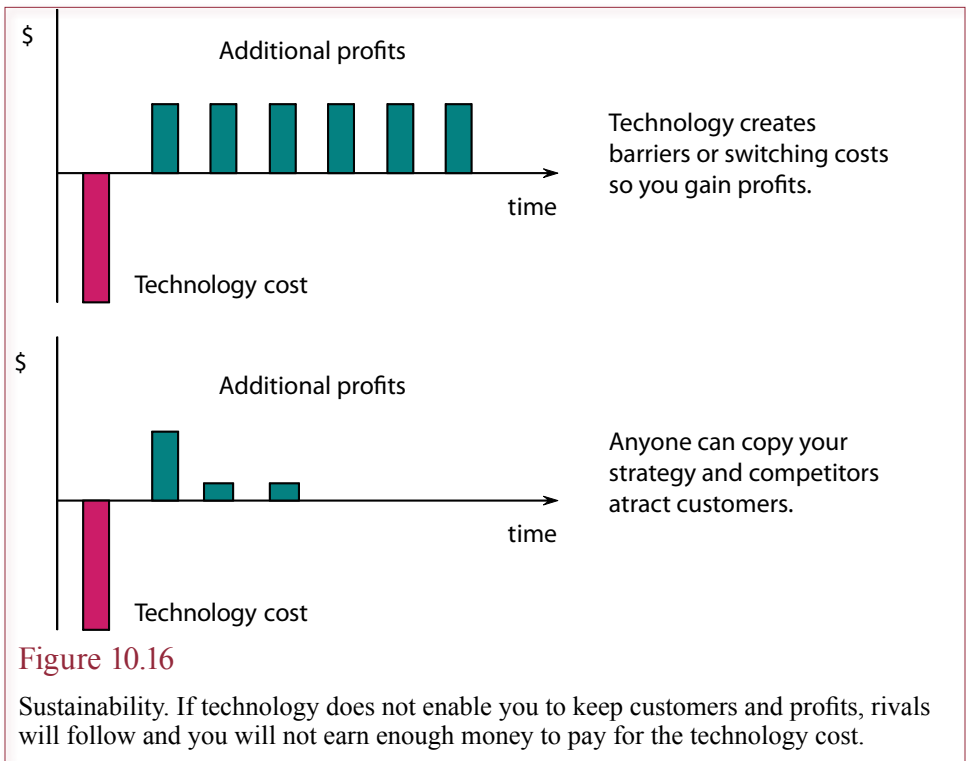
A good starting point for developing a structure is the old debating approach: problem description, plan, and advantages. Use the problem description to identify the most important problems and the cause of the problems. This section must clearly communicate the need for a change. The plan itself must be detailed and as specific as possible. You should include implementation issues, costs, and alternatives or contingency plans. Be sure to include a section that explains how your plan is going to solve the problems you identified.

Your analysis needs to identify any measurable goals and financial implications. If the goal is to reduce costs or save time, quantify those numbers. Consider the effects on human resources. Will the technology reduce the number of employees? Will you retrain employees, or need to hire more within the MIS department? What are the critical success factors for the firm and the project? What are potential risks of the project? Such as cost, alienation of employees or customers. Identifying these risks up front makes it easier to find ways to mitigate them later.

#### Quick Quiz:

1. Why is practice so important in learning to diagnose business problems? Where will you get this practice?
2. Where do you place the expectation elements in the business plan?
3. How is the problem description different for a business case compared with an actual business problem?





**Figure 10.16**

Sustainability. If technology does not enable you to keep customers and profits, rivals will follow and you will not earn enough money to pay for the technology cost.

## Sustainability

Remember that to be successful a strategy needs to create a barrier to entry. If you spend large amounts of money on new technology to gain market share, you need to be able to sustain an increase in profits for a long enough time to recover your costs. As shown in Figure 10.16, if you spend the money and your rivals immediately follow, everyone ends up with higher costs and no additional profits. This argument has been made many times over the years as a reason to avoid strategies involving technology. It can be difficult to determine if the argument is legitimate or if it is merely an excuse to avoid change.

Nicholas Carr explored these ideas in an article in the *Harvard Business Review* in April 2003, claiming that IT no longer has a strategic benefit. The thrust of the argument is that technology prices have declined so far that IT no longer provides a barrier to entry. Any firm can almost instantly copy anything you do. Any short-term advantage you might gain from technology is not sustainable. In fact, most information technologies today can be purchased as services from various firms. Since the computing hardware and software are readily available to any organization, it will be difficult or impossible to use it to gain a competitive advantage.

Many aspects of this argument are true. Rarely is the information technology the source of a competitive advantage. Instead, the benefits arise from how an organization applies the technology to solve problems and improve the management and decision making of the firm. The use and application of technology depends heavily on the people and management of the organization. As a weak analogy, you could give guitars to 1,000 people, but only a few of them would ever become

### Reality Bytes: USA Today: What is a Paper?

USA Today was one of the first national newspapers—certainly the first to target general news, and to use color. At one point, it had the largest newspaper circulation in America. By 2010, the company hit serious problems. The biggest two: Circulation was plummeting and advertising revenue had collapsed. On finally recognizing the shift in the way people obtain news, the paper began downsizing, eliminating 130 jobs (9 percent of its employees), and shifting its focus away from the printed edition. The goal was to create an organization that could deliver news through the Web site and react quickly to changing preferences. Over time, USA Today had become stale. The environment changed to online, instant access to news, entertainment, and sports; but USA Today had made few changes. The company was finally beginning to understand the need for change. But, the task is arduous. Craig A. Huber, an analyst at research firm Access 342 noted that “I don’t blame them for tinkering with the model, but everybody has been trying to do that. They have to restructure. They don’t have a choice in this quickly evolving media landscape.”

Adapted from Jeremy W. Peters, “USA Today to Remake Itself to Stress Digital Operations,” *The New York Times*, August 27, 2010.

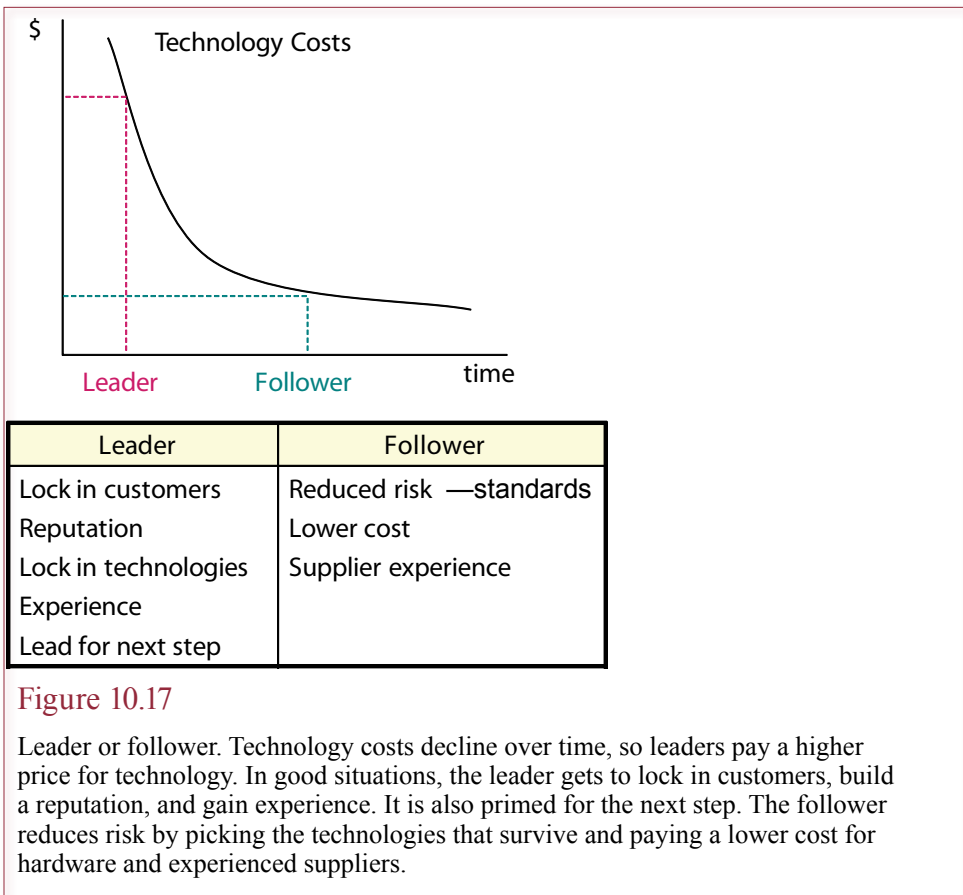
proficient musicians and only a couple would be able to form a successful band. Hardware and software are not enough to provide a competitive advantage. You need an organization that has the knowledge and willingness to change and use the new technologies to alter the way it operates.

Examine the classic cases in detail and you will see that the gains arose from the way the technology was applied. American Hospital Supply/Baxter Healthcare used the technology to provide better information and lock in customers. Merrill-Lynch and FedEx used the technology to create new products and services. American Airlines used its giant databases to provide knowledge to make better pricing decisions. Even if you can copy the hardware and most of the software, can your organization achieve the same benefits?

Consider groupware as a relatively new technology. Any organization can install SharePoint servers at minimal cost in terms of hardware and software. Yet, even today, ten years after the introduction of the technology, how many have done so? How many are effectively using the technology? And, how many have altered their operations to take advantage of the communication and teamwork features to reduce costs, find new solutions to problems, and add flexibility to the organization? The technology is definitely important, but ultimately it is the management and workers in the firm that must adopt the technology to alter the operations and gain the full benefits.

### Leader or Follower

Another often-debated aspect of strategy is the importance of the **first-mover** advantage. The concept comes from game theory, which is often used to study rivalry. In some situations, the organization that adopts a strategy or technology first will be seen as the leader and will acquire customers who will then be reluctant to switch back. Even after a competitor adopts the same technology, the customers will stay with the first firm. The first mover might also gain a reputation for being innovative, which might attract additional customers. Ultimately, the first-mover



advantage depends on the customers and the nature of the innovation and the industry. If the technology increases the switching costs, then the value of being the first firm to adopt a technology is higher. With each strategic idea, you will face arguments over the potential strength of being the first adopter.

The issue of being a leader or a follower is critical with information technology—because the costs will drop over time. As shown in Figure 10.17, if you choose to wait, you lose the first-mover advantage, but costs decrease the longer you wait. Additionally, any technology strategy carries risks. By waiting, you can let some other firm take the risk, while you wait to see if customers actually care about the new services or options available. Remember that at any point in time, you have a choice of several technologies. It is difficult to guess which technology will succeed and become a standard.

Many times you face this same decision as a consumer. Look at television and cell phone technologies. If you adopted HDTV, 3D, or 4G cell phones early then you paid a relatively high price for the technology. Plus, content and access were limited because most people had not yet switched. If you can manage to wait a year or two, prices inevitably drop (or weak technologies disappear), and you can save money by not being the leading adopter. Fortunately, consumers do not have to worry about making money or beating other consumers with these technologies, so the decision is quite a bit easier for them than it is for businesses.

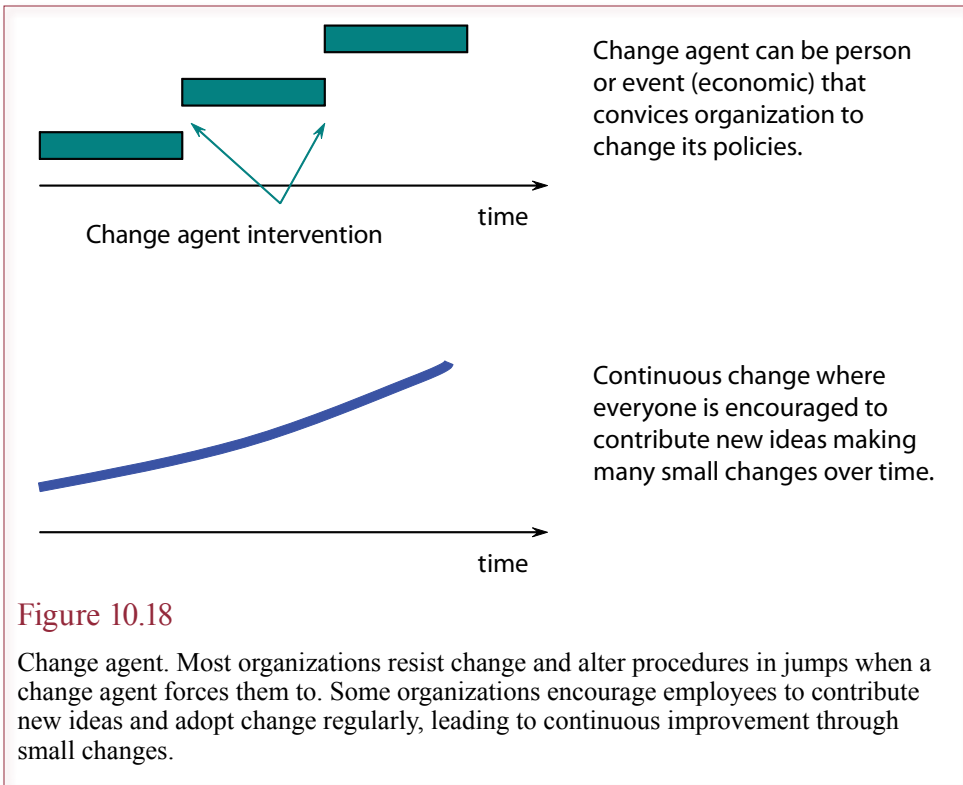
Large firms can be reluctant to be leaders. Their size makes it difficult to change operating procedures, and tends to add bureaucracy that delays making decisions. It is often easier to watch small competitors and let them adopt a technology first. Even if a small competitor is successful, the risk is minimal because the number of customers affected will be small. Once a technology is seen as useful and the prices drop, the big firm can use its size to purchase the technology, fix any perceived problems, and generate a marketing campaign to sell the new services to the rest of the world. Because it is difficult to patent the use of information technology, this approach is generally legal; and most customers will never know about the original small firms that tested the technologies. In some extreme cases, large companies have spun off smaller firms to test experimental technologies. In other words, if you cannot find a smaller firm to do the testing, you can create your own small firm to test a technology. Companies with many small stores, such as franchises, often adopt a similar approach by selecting one or two stores to test new products and services on a small scale.

Choosing to be a leader or follower in information technology is one of the biggest strategic decisions an organization must make. The choice does not have to be all-or-nothing. It can be applied differently to various divisions or even types of technologies. Also, the decision needs to be revisited periodically to correct for changes in technology, the business environment, and the competition.

### Change Agents

Organizations need rules and methodologies to function. Basic day-to-day decisions need to be handled at the customer and operations level. Without rules and procedures, all decisions would filter back to the top levels of the organization and it would take forever to get anything done. But the drawback to rules and procedures is that everyone is reluctant to change them. The larger the change, the more difficult it will be to get it accepted and implemented. More importantly, organizational change does not happen by itself. **Change agents** are people or events that cause an organization to reevaluate its rules and procedures. When a person is the change agent, that person often becomes the champion for the new ideas. However, change agents are rarely appointed and tend to gain prominence by random chance. In theory, you could appoint someone to be a change agent—continually searching for new ideas and technologies and bringing them to the attention of everyone else. But, it would likely be a frustrating job, and the person would likely get blamed for a lot of problems. On the other hand, some people like to try new products and new ideas, and other people naturally turn to them for advice and recommendations. These people are often natural change agents—simply by providing information and experience to others.

Economic events can be natural change agents. Many of the classic cases were driven by economic changes. These changes opened the way for new business opportunities and made it possible for firms to expand or move into new areas. For example, Merrill-Lynch altered the entire world of banking by using technology to offer a new type of account to customers. But, this account was wildly adopted because of the unprecedented high interest rates and the government restrictions imposed on commercial banks. Merrill-Lynch had the technology and the management insight to take advantage of these changes. Similarly, American Airlines was driven to adopt yield pricing by the emergence of People Express as a new competitor—because of the relaxation of government regulation in the airline industry. American Airlines had the technology and data in place for several years, but felt no need to adopt it until pressured by this external change agent.



As shown in Figure 10.18, most large organizations tend to resist change, causing them to adopt ideas and technologies in lumps. This approach might be useful because it minimizes day-to-day disruptions. However, it tends to make the firm a follower instead of a leader, and the changes that are eventually implemented might be more disruptive than necessary. Yet, few firms have the flexibility to make continuous changes. On the other hand, continual evaluation and adjustment are hallmarks of managing for quality. In these organizations, change and innovation are encouraged and rewarded. Each approach has its strengths and weaknesses, and again, the choice of how to identify and adopt change is a strategic management decision. Just be sure that you consciously adopt the strategy, and not fall into a choice by inaction.

## Cloud Computing

**Can cloud computing provide strategic advantages?** In many ways, cloud computing is an indicator that many aspects of information technology have limited power as a strategic tool. One goal of cloud computing is to reduce fixed costs and to make it easier for more firms to implement the same technologies. When even small companies can implement the same technologies as large companies, it is going to be difficult to use it for a competitive advantage. This statement does not mean that technology is unnecessary. On one level, it means that firms have to at least experiment with every possible technology to see how it might create a competitive advantage. On a broader level, firms can still

gain some benefits to technology if the workers and managers are better at applying it to solve problems in unique or more efficient methods.

These concepts echo many of the fundamental ideas of strategy. Simply adopting a specific technology rarely provides a competitive advantage. Instead, firms need to find a concept or new way of doing business. Technology provides the means to create these new methods or concepts. And it requires management creativity to find and efficiently apply these solutions.

On the other hand, powerful technology available at low costs and with a global reach enables firms to experiment and innovate at low costs. Firms that emphasize creativity and design could use the cloud computing technologies to continually adapt and lead the way with new products and services. In particular, services can be tailored to ever-changing regions. Yes, other firms could follow, but by then the leader will have moved on to something new. In a sense, creativity becomes a competitive tool that can be amplified with information technology.

## Summary

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Information systems can provide benefits beyond traditional cost saving. Competitive advantages can be gained by creating barriers to entry and gaining control over distribution channels. Using information systems to build ties to suppliers and customers can provide lower costs and better quality products. Computer systems also provide incentives for customers to remain with your company if they incur costs of learning new systems and transferring data when switching to a competitor. Information systems can also be used to differentiate your products from the others in the marketplace. Similarly, innovative services offered with the help of technology can entice customers and expand your market.

You can search for competitive advantages by examining Porter's external forces of rivals, customers, suppliers, substitute products, and new entrants. You can also search for strategies in research, engineering, and design. In manufacturing, you can look for ways to decrease costs and improve logistics. In marketing, potential gains can be found in better understanding of customer wants, as well as sales and order management. Services can be supported through better information flows and workgroup products. Management can be helped with better data and better decision tools. The government also strongly affects organizations and strategy, but finding IT interactions with the government is relatively difficult.

Strategic systems face many risks. They tend to be expensive and difficult to create. Any gains created may disappear when competitors pick up the technology and imitate your offerings. In addition, making strategic changes to your firm might alter the industry, which might adversely affect your firm. And if these problems are not enough to discourage you, remember that attempts to monopolize a market are illegal, so you have to make sure that your plans do not violate governmental regulations.



### A Manager's View

With increased competition, every manager is being asked to identify ways to improve the company and find an advantage over the rivals. Gaining a competitive edge is not easy. Examining the entire value chain is a useful place to start. Information systems can provide data and evaluate models to help you identify strategic applications. Information systems can also provide direct advantages by creating a barrier to entry, gaining control over distribution, cutting costs, improving quality, and improving ties between suppliers and customers. Choosing an effective strategy is a critical task in e-business. Creating a plan and successfully implementing it are critical steps in strategy.

## Key Words

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antitrust laws  
barriers to entry  
change agents  
distribution channels  
external agents  
first mover  
Five Forces model

mass customization  
product differentiation  
rivals  
statistical quality control (SQC)  
switching costs  
total quality management (TQM)  
value chain

## Web Site References

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	Management Consulting	
Accenture		<a href="http://www.accenture.com">www.accenture.com</a>
Bain & Company		<a href="http://www.bain.com">www.bain.com</a>
Boston Consulting Group		<a href="http://www.bcg.com">www.bcg.com</a>
Booz Allen & Hamilton		<a href="http://www.bah.com">www.bah.com</a>
Deloitte Consulting		<a href="http://www.deloitte.com">www.deloitte.com</a>
McKinsey & Company		<a href="http://www.mckinsey.com">www.mckinsey.com</a>

## Review Questions

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1. If an industry has four large firms versus a thousand small firms, is it easier or harder to create strategies?
2. Why is strategy so dependent on external agents?
3. What are the risks and costs of strategic implementations?
4. For a large manufacturing firm, who are the customers? How many different types of customers can there be?
5. Why are barriers to entry important to gain a competitive advantage?
6. How does control over distribution channels give a firm a competitive advantage?



7. How can information systems be used to gain control over distribution channels?
8. What are switching costs, and how can they give a company a competitive advantage?
-  9. How can information systems be used to enhance product differentiation and create new products?
10. What role is played by information systems in improving quality management?
11. Within management, how can information technology provide a competitive advantage?
12. How do antitrust laws make the role of IT more important in finding a strategy?
-  13. Is it possible for a cloud computing application to lead to a strategic advantage?
14. What are change agents and what is their role in the adoption of new technology?
15. How could social networks be used as a strategic tool by a manufacturer?

## Exercises

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1. Choose one large firm and read the annual report ([www.sec.gov](http://www.sec.gov)). Identify the primary strategic directions and which of the main techniques it uses to gain a competitive advantage.
2. How long can firms maintain an advantage using an information system? Research one of the classic cases and find out how long it took for the competitors to implement a similar information system (for example, Merrill Lynch and its Cash Management Account, American Airlines and the Sabre System, Levi-Strauss and its Levi-Link ordering system, or Federal Express and its tracking system). Find out when the system was implemented, identify the competitors, and find out when they implemented similar systems. Did the original company continue to update its strategy? Collect data on sales and profits for the firms to see whether there were major changes.
3. Pick an industry. Find two firms in the industry—one a technology leader, the other a follower. Get the financial information on those firms for the last five years. Find analyst summaries of their operations. Compare the two firms. Are there differences in finances, operating methods, or customers?
4. Choose an area of management, such as marketing, manufacturing, or logistics. Find an example of a firm that you believe is doing a good job applying IT in this area. Briefly explain how this usage could provide strategic benefits to the firm.

5. Choose one of the IS techniques to gain a competitive advantage. Identify a firm (not one of the examples in the chapter) that is using that method. Briefly describe the financial position of the firm and how it is using information systems.
6. For each of the following firms, identify the primary strategy of the firm (such as cost, quality, customer links, and so on).
  - a. Wal-Mart
  - b. Toyota
  - c. Apple
  - d. Kohler
  - e. Yelp
  - f. Pfizer
  - g. Starbucks
  - h. General Motors
  - i. Red Bull
7. Has the Internet changed the distribution of songs? In particular, is it easier or harder for small labels and independent groups to get their music heard and sold to consumers?
8. Examine the market for tablet computers starting with the Apple iPad. Identify how the various companies introduced new features and how the others responded. What did Apple gain by being the first mover?
9. How could an exercise gym use information technology to gain a competitive advantage?




### Technology Toolbox

10. Using a GIS tool, compare the sales for Rolling Thunder Bicycles against population and income.
11. Find at least two Web sites or news reports that use Google maps to highlight geographic information.
12. Create a map with Microsoft MapPoint or Google maps and insert markers for the headquarters of at least five companies.
13. Choose a company case at the end of one of the chapters in this book. Perform an initial business analysis of the company. Focus on identifying the major problems faced by the company and the cause of those problems. Identify the primary level of the problem (operations, tactics, or strategies).
14. Select a company in the Fortune 500 (or Global 1000). Get some basic background information on the company and read its latest annual report. Using Porter's framework, identify its primary rivals and the level of rivalry. If they exist, identify major customers and suppliers and discuss the sales methods used by the organization. Discuss any potential competitors or substitute products that might arise in the near future. Describe any barriers to entry that might keep them out.



## Teamwork

15. Each team member should read through at least two industry cases in the chapters of this book. Identify whether the firm is a leader or a follower in terms of strategy and technology. Compare each firm's financial data to that of the industry (for example, by sales and number of employees). Combine the individual analyses and summarize them. Identify any patterns you might see. For example, do the larger firms tend to be leaders or followers in technology?
16. Choose a firm that provides reasonable amounts of management information (such as a local firm or a well-documented public firm). Have each team member choose one area (research, engineering, marketing, and so on). Identify the strengths of the firm in the area. Create a short plan to improve the company's use of IT within that area. Make sure the usage fits with the overall strategy of the company.
17. Choose an industry. Assign each team member to investigate a level within the production chain. Each person should identify the tasks that occur at the specified level along with the major firms. Identify the rivalry and any dominant firms at each level. Identify the use of IT at each level and any ties across levels. Combine the results and briefly discuss where on the chain you would prefer to enter as a new firm.
18. Choose a large firm (perhaps an automobile manufacturer). Use the annual report to identify the financial condition of the firm. Use the management letter to identify the basic strategies of the firm. Identify the firm's primary competitors. If possible (try searching MIS magazine Web sites), identify the technology level used in the company.
-  19. Research the rivalry and strategies being pursued by Amazon and Barnes and Noble. Look at market share and service plans and pricing. What are the short-run and long-run strategies of each company? Is one firm stronger than the other?
20. Each person should find a company that has used innovation (creativity) successfully. Identify any use of information technology in the process. Write a short paragraph about the case. Combine the information from all team members and vote on which company made the best use of information technology.



## Rolling Thunder Database

21. Identify the competition in the industry. Who are existing rivals? Who are potential rivals? Be sure to define the industry carefully. Consider using North American Industrial Classification System (NAICS) codes.
22. Perform a value chain analysis of the company. Could they improve profits by expanding vertically or horizontally? Are there additional products we should consider offering?

23. The management has the opportunity to purchase a chain of retail bicycle stores. Evaluate the strategic aspects of this proposed acquisition. What will be the effect on the information systems? Can the existing information system be used to improve the operations of the retail stores? What additions and improvements would be needed?
24. How can the company use social networks to increase ties to customers?
25. Examine the value chain in the bicycle industry. How many levels are there and which levels are the most profitable?
26. A key element in the bicycle industry is that sales are driven by the popularity of the sport, which in turn is influenced by demographics. Consequently, sales can decline over time or suddenly expand for particular bicycle models. How can a manufacturer like Rolling Thunder Bicycles strategically deal with these issues?
27. Use Porter's Five Forces model to examine Rolling Thunder Bicycles relationships and long-term strategic potential.

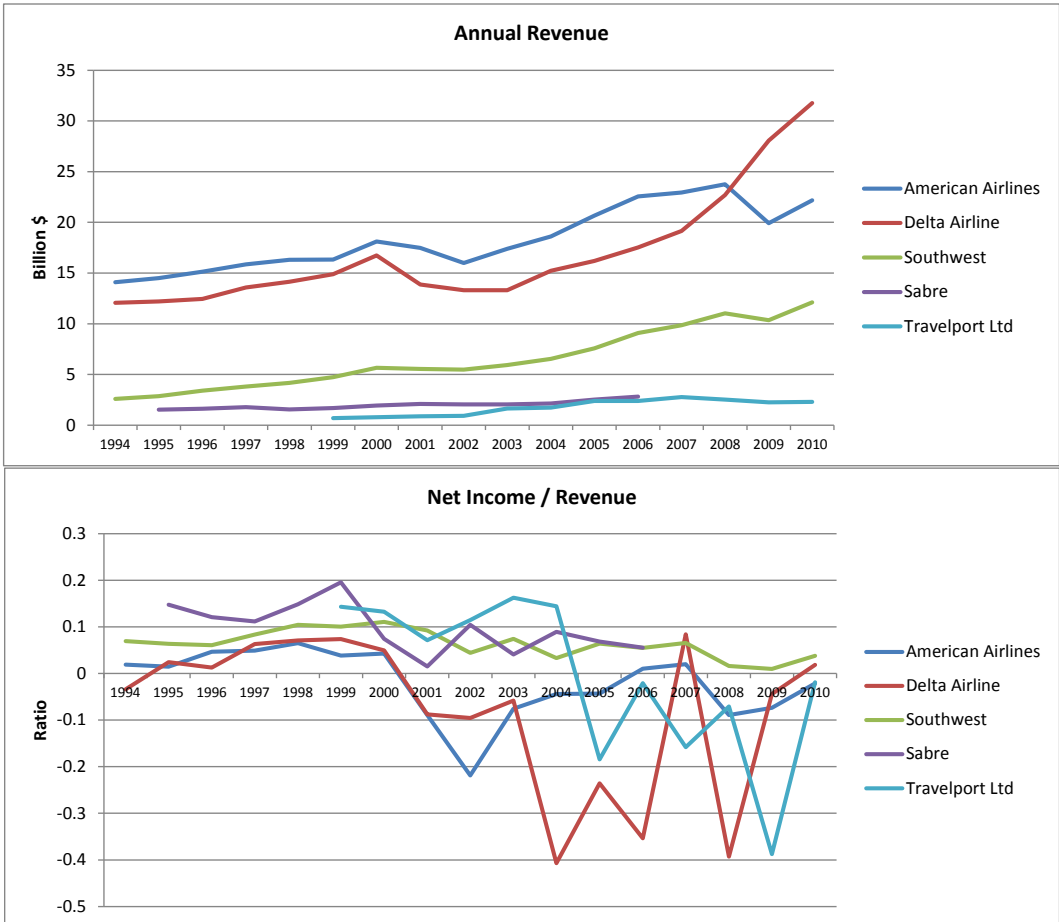
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## Cases: The Airline Industry

### The Industry



To understand the state of the airline industry, you have to look at some of the history. The most important historical issue is that the airline industry was heavily regulated until 1978. Until then, the civil aeronautics board (CAB) controlled all of the business aspects of the airlines, including landing rights and fares. Several large airlines were established and grew during that time. In 1978, the CAB was disbanded and the airlines were free to select routes and set prices as they chose, without government oversight. However, the FAA still controls several safety issues, including work rules for flight crews, the number and spacing of flights into airports, and national flight lanes, as well as several other details.

So, what happened when flights were deregulated? This is a good time for you to start thinking like an airline executive. Were you making money? Did your passenger mix suddenly change? Are your revenue and costs any different initially? The simple answer is that initially, very little changed. As an established company, with procedures and a system that works and makes money, you would not be inclined to change anything.



### *Deregulation and Competition*

But, all it took was a little time. A few airlines started offering new flights on high-demand routes. Then, Donald Burr founded People Express, the airline that scared every other business manager, starting in 1981. As a no-frills airline (it charged \$3 to check luggage and sold snacks on the plane), the airline charged incredibly low prices to fly tourists. You no longer had to be in the upper class or funded by a business to fly. Based out of the unused international terminal in Newark, New Jersey, the company picked up non-union crews, negotiated with the FAA to fly with only a pilot and copilot (no flight engineer), and charged fares of a paltry \$59 to Chicago or \$99 to London—a tiny fraction of the fares charged by the traditional airlines.

With their substantially higher cost structures, the mainstream airlines could not compete. So, why did People Express disappear and some of the other airlines survive? Part of the answer is mismanagement—People Express tried to grow too rapidly and did not have a solid management structure in place to handle the problems. But, a big part of the answer is that American Airlines fought back with information technology. The company quickly realized that People Express appealed to tourists who were very price sensitive. Business people stayed away from the discounter and wanted the amenities and reliable service provided by the mainstream airlines. So, American Airlines turned to its reservation system (Sabre) and estimated the number of people on every flight who were business people. It then came up with the differential pricing system (yield management) that is still in use today. Business people, those who book a couple of days before the flight and do not want to stay Saturday night, get charged thousands of dollars. Tourists, who book early, are offered low fares that compete with the discounters. The basic premise is that the large airlines want to charge higher prices and fly business people, but there is no point in flying empty seats, so they discount the seats until they are all sold. Today, it is likely that almost every passenger on a flight has paid a different price (McCartney 2003).

### *Growth of the Discounters*

People Express did not have the information systems and could not compete. The big airlines had won—but only for a while. They did learn to adopt the hub-and-spoke system pioneered by People Express. Small feeder flights brought passengers to a few major airports, where passengers made connections to the next hub. The cost advantage of the hubs is that at the end of the day, all the planes and flight crews returned to a hub city. Consequently, maintenance facilities are centralized into a few key airports instead of scattered around the country. Plus, the key airports handle multiple flights each day, simplifying routing decisions.

But, the story is not over. Southwest Airlines was also an upstart—beginning in Texas in 1971. By flying within the state, the airline was not subject to CAB regulations. Founded and largely run by Herbert D. Kelleher, the airline grew slowly to maintain control. Part of the simplicity lay in its fee structure—far simpler than the major airlines, Southwest prices flights so that they are profitable. By supporting several daily flights to each destination, with reasonable fares, Southwest promotes itself as the “company plane.” By holding down costs (flight attendants often help clean the airplane, and the company flies only Boeing 737s to minimize maintenance costs), the company grew steadily. More important, Southwest Airlines has been profitable every single year for over 30 years—a statement that no other airline can match ([www.southwest.com](http://www.southwest.com)).

### *Recent Changes*

To understand the current state of the airline industry, you also have to look at September 11, 2001. The event shocked the American people. The industry and government response provided almost as much of a shock to the industry. Suddenly, flying became considerably more complicated—passengers and airlines wrestled with long security lines and new rules. The U.S. government bailed out most of the airlines by providing billions of dollars in grants and loan guarantees.

Yet the major airlines were still saddled with strict working rules and high wages through negotiated contracts. In December 2002, United Airlines filed for reorganization under Chapter 11 of the bankruptcy code. In 2004, the company was still struggling to obtain financing to emerge from bankruptcy ([www.pd-ual.com](http://www.pd-ual.com)). On September 15, 2005 both Delta and Northwest filed for bankruptcy protection. A large reason for filing for bankruptcy appeared to be a negotiation strategy aimed at reducing labor contract costs. The airlines also declared their pension plans bankrupt and foisted them onto the federal pension insurance program, removing the liability and reducing the payouts to retired pilots and employees.

Several other airlines were created in the early 2000s to pick up passengers on highly traveled routes. JetBlue, founded in 2003, is one of the largest. JetBlue is based out of JFK airport in New York City and initially focused on East Coast destinations. It has expanded to cross-country flights and is slowly adding some Western cities to its routes. It has been successful (passengers like the DirectTV broadcasts available on the seat-back sets) and profitable ([www.jetblue.com](http://www.jetblue.com)). Airtran, a successful start-up from 1998, has been hammering Delta's fares in the Atlanta airport—Delta's home base ([www.airtran.com](http://www.airtran.com)). While still only carrying a fraction of the passengers of the big airlines (maybe 10 percent), JetBlue and AirTran have been growing (*The Wall Street Journal* 2002). The secret to success, as explained by Joe Leonard, the CEO of AirTran, to a congressional committee "is not to be a low-fare airline, but to be a highly efficient airline, whether you are a big airline or small, and to adapt to the changing marketplace" (Leonard 2004). In 2011, Southwest purchased AirTran.

The obvious question at this point is that since Southwest has been so successful with its strategy, why don't the airlines simply copy their formula? Yes, 9/11 and the resulting gasoline price increases due to the war with Iraq have put added pressure on the airlines. But, the big airlines were struggling even before these events. The answer is that it might not be possible for the big airlines to make the huge changes needed. Delta and United started some experiments. Delta created a subsidiary called Song in 2003 designed to compete directly with the discounters—focusing on leisure travel between high-demand cities ([www.flysong.com](http://www.flysong.com)). United formed Ted (a part of *United*) in early 2004 for the same purpose ([www.flyted.com](http://www.flyted.com)). Although the fare rules for Song and Ted are usually simpler than for the parent company, the interesting part is that it is sometimes cheaper to fly the parent airline. In 2004, the CEO of Delta, Leo Mullins, resigned, and the interim CEO suspended any expansion of the Song airline. And the Ted airline was subsumed back into United.

### *Airline Costs*

If airlines are going to cut costs, it helps to know where those costs are. The Air Transport Association (ATA) tracks these costs and releases summary data. The easiest way to understand the costs is to examine them as a percentage of the total. By far, labor costs are the largest share (38.4 percent). All other costs, mostly

administrative overhead, are second (23.7 percent). Fuel costs vary over time, but most airlines use futures markets to hedge their costs (11.6 percent). The cost of the planes seems reasonable (10.2 percent), but you also have to add in the interest costs of the debt for the planes. Since interest rates were at historical lows in 2003, the cost was relatively small (3.0 percent). Maintenance material (2.5 percent) is usually steady, unless an airline is running a large percentage of older planes. Passenger food costs have been declining as airlines drop their food programs (2.3 percent). Airlines still pay some commissions to travel agents, but that number is dropping steadily (2.2 percent). Airlines have to pay landing fees to airports to use their gates (2.1 percent). Insurance costs (1.5 percent), communication (1.5 percent), and advertising (1.0 percent) are all relatively small components (McCartney 2002). These industry averages conceal the differences between the airlines. Through cheaper labor contracts, newer planes that need less maintenance and use less fuel, and a focus on costs, the discount airlines average a cost of 7.3 cents per mile, compared with 11.7 cents for traditional airlines (Rosato 2004).

### *The Possible Future*

A large part of the differences with Song and Ted are the union contracts. The major airlines and the flight crews need to find some way to negotiate contracts that enable the carriers to compete with the discounters. The airlines also need to find a way to reduce costs and provide a service that people are willing to pay for. The good news for passengers is that airlines should be more willing to try innovations and search for ways to provide better service.

For business travelers, some new options are on the near horizon. Several companies are building small, “personal” jets that will cost less than \$1 million. Some companies will purchase the jets for company use, but the annual upkeep and crew costs still make them expensive. On the other hand, they might enable a type of air taxi service to be created. Flying from small regional airports, the jets could offer quick service directly from one city to another, bypassing the big airline hubs and their driving, parking, and security hassles. This service will probably be too expensive for leisure travelers, but would appeal to a business person who is currently being charged \$2,000 for a major airline flight. That would leave the big airlines running a type of low-cost mass-transit bus service (McCartney 2003). The micro-jet option never emerged as a major player. The technology still exists, but high fuel costs probably make it too expensive to fly a small number of passengers.

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## Case: Delta Air Lines

Delta (ticker: DAL) is one of the original airlines—tracing its history back to its first passenger flight in 1929. The company, headquartered in Atlanta, had revenues of \$13 billion in 2003—a steady decline from 2000. With over 60,000 employees, the company flew about 100 million passengers in 2003. The company, and its code-share partners, fly to almost 500 cities in 86 nations ([www.delta.com](http://www.delta.com)). Delta's books showed a net profit in 2000, but the company has been in the red since that time. Delta has reported a total loss of \$3.7 billion in 2001, 2002, and 2003. For most quarters, the company is losing money even on operations (annual report). Fred Reid, president of Delta knows the problems: "There's no question whatsoever in Delta's mind that we are in the midst of a profound, fundamental and truly irreversible series of changes in which the value proposition to the investors and the customers is changed unalterably. In this new world some airlines are winning and some airlines are losing, and I would say that Delta is still positioning for long-term success" (Bond March 2004).

In April 2007, Delta emerged after spending 19 months in bankruptcy. The airline reduced capacity by about 10 percent and 20 percent fewer employees, as well as reduced operating expenses by about \$3 billion a year. The rest of the industry also reduced flights so Delta was flying at 84 percent capacity on average flights compared to 72 percent when it filed bankruptcy. Fares also edged up, improving revenues (Isidore 2007). The airline also started expanding into international markets—assuming there was less competition on international routes, enabling it to charge higher prices. The company still lost \$6.2 billion on operations in 2006 (2006 Annual Report).

### *Pilots and Costs*

As of 2004, Delta's pilots were the highest paid in the industry. After acrimonious negotiations, then-CEO Leo Mullins granted the union huge pay raises. In 2004, Leo Mullins was removed as CEO. Given the bankruptcies at the other airlines, Delta then attempted to renegotiate all salaries. The company executives have discussed the possibility of filing bankruptcy to force the union to negotiate lower salaries (Bond May 2004). Many of Delta's older pilots are abandoning ship before it sinks. In mid-2004, 288 pilots applied for retirement, 266 of them were for early retirement. An additional 300 had already applied for retirement in September 2003. Despite the retirements, Delta has plenty of pilots available: 8400 on active duty, plus 1,060 on furlough (*Aviation Week & Space Technology* June 2004). Delta's total costs of flying domestically are 30 percent higher than Southwest's (McCartney October 2002).

### *Subsidiaries*

To fight the discount airlines, Delta established or purchased several subsidiary airlines. Delta Express and Skywest are two regional subsidiaries that operate out of Delta hubs. These airlines fly smaller planes or regional jets and deliver passengers to the hub, providing access to Delta in smaller cities. A key arrangement with the pilot's union allows the regional airline pilots to be paid less and fly under less limiting rules—as long as the planes carry a limited number of passengers.

In 2003, Delta launched service on Song. Although the goal was to keep fares relatively low, Song was competing more with JetBlue than with Southwest. In particular, the airline offered seat-back television for satellite programs, pay-per-view movies, and video games. However, the company had trouble getting the

systems installed and had to begin operations without the technology for several months. Another drawback faced by Song was that they used the same Delta personnel, with the same contracts and lack of focus on cost cutting (Melymuka 2003). When Leo Mullins was replaced by Gerald Grinstein as CEO in 2004, Grinstein halted expansion of the Song division.

In 2008, Delta bought Northwest Airlines and merged the two companies (Crawley 2008). It took several years to merge the names and information systems of the two companies.

### *Information Technology*

Information technology has an impressive role in the history of airlines. At the pure transaction level, IT is necessary to handle the millions of reservations a day. Running from huge databases, the large systems find flights, check seats, and bill customers when seats are reserved. When American Airlines used its system to create yield management and differentiate prices, it represented a milestone in the competitive use of technology. But today, the reservations systems have been moved out to subsidiaries and passengers can book online or through third-party reservation systems. Although the systems are still used by some of the major airlines to jockey prices, companies are increasingly looking at simpler fare structures. In 2004, Qantas, the Australian airline, decided it was pointless to run its own system. CIO Fiona Balfour, said “I don’t think airlines get a competitive advantage from IT anymore. They get competitive advantage from how they use it. Running IT at a low unit cost becomes a competitive advantage” (Kontzer 2004). Nonetheless, Delta (and most of the other major airlines) continues to run its own systems. Delta’s CIO, Curtis Robb, believes that outsourcing will not necessarily reduce costs or improve service. He observes that “we get payback on a yearly basis for in-house IT work and we get it at a fraction of the cost” (McDougall 2003). Note that the in-house reservation systems are separate from the aggregators including Sabre and Orbitz.

Away from the reservation system, Delta is working harder to use the transactions to increase the operational efficiency. For example, the company runs the Delta Nervous System (DNS) that pushes data from the transaction system out to the desktop and even handheld computers. For example, as a plane arrives at an airport, the gate agent and luggage handler are notified electronically. A first step in creating the DNS was to set common definitions for data stored in over 70 different databases and place every item into one of 15 subject categories. This system forms the foundation of all the real-time applications. For example, the gate information display simply queries the DNS data layer for real-time information about the specific flight, formats it, and presents it to the customers. New applications can be built relatively quickly—programmers need only identify the data they require and can focus on the application and display. At Delta hubs, the DNS data is supplemented with data from the federal air traffic control (ATC) system. This data is examined for late flights and enables managers to spot problems and reschedule flights. DNS is a \$1.8 billion project started in 1998 (*Air Transport World* 2004).

The company also installed customer relationship management software for the call center. The CRM system enables clerks to see the entire picture of the customer who called (McDougall 2003). In the process, the company consolidated 30 customer databases into one, with three data warehouses to support analytical functions (Gareiss 2003). The newer jets offer additional ways to save



money through integrating with information technology. The Boeing 777 collects information from various subsystems electronically. This telemetry is collected and transmitted to the maintenance engineers. If a problem arises, such as excessive vibration in an engine, managers can spot the problem and correct it before it causes additional problems. The company is also working to create electronic documents for all of the maintenance procedures. Electronic versions can be provided instantly to maintenance workers—saving search time (McDougall 2003b).

Like other airlines, Delta has installed kiosks to encourage departing passengers to record their own check-in, saving money by reducing the number of ticketing agents. Delta has also created a telephone system that customers can use to check in. More importantly, the IT system automatically monitors late flights and missed connections. If a passenger is not going to make a connection, the system automatically rebooks the flight (Schwartz 2004).

In 2006, Delta launched a three-year project to update its primary systems with a service-oriented architecture (SOA). One goal was to replace BEA System's Tuxedo middleware with standards-based technology. Middleware takes data from one system and converts it into a format that can be used by other systems. By standardizing the data interchange, it will be easier to replace various systems in the future (Havenstein 2006).

Delta was able to use the bankruptcy filing as a lever to renegotiate contracts, including a 27 percent drop in software fees from \$3.74 million to 2.73 million charged by SAP. Delta uses SAP software for ordering supplies and tracking spare parts (McDougall 2006a)

Bankruptcy is not a panacea—it can cause more problems than it solves. In October 2005, Delta's pricing system crashed for 12 hours, costing the company more than \$4 million in revenue. IT outages also led to several flight delays. Delta reported that it experienced "unprecedented attrition" and chaos within the IT department as workers left in droves following the bankruptcy filing—only 39 percent offered a job decided to stay. In August 2006, Delta outsourced its operations to IBM under a seven-year contract (McDougall 2006b). With a shortage of workers, Delta turned to other providers to help with systems, but bankruptcy made it more difficult to pay the bills. Unisys asked the bankruptcy court to pay it \$37,000 for developing an application to assign a unique product code to the special handling required for transporting human remains. According to the work order, Delta's system did not distinguish between human remains and other priority shipments, leading to "service failures and irate customers" (McDougall January 2007). Cisco also had to file a claim to get paid for \$20 million in leased equipment (McDougall March 2007). If you were a CIO at a major corporation, you would probably see similar claims and have to deal with these standard issues. The interesting aspect of bankruptcy filings is that the information becomes public.

On a more personal level of technology, airlines have been adding Wi-Fi service to the flights so that passengers can surf the Web aboard planes. The airlines purchase the service from a third-party such as GoGo (Lawson 2011).

### Questions

1. Why do people fly on the discount airlines? What do they not like about the discounters? Can Delta combine these answers with IT to regain market share and profits?



2. How does Delta use technology to reduce costs? Is it enough to make a difference?
3. Can Delta use IT to become more like Southwest? Is that the best strategy?

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## Case: Southwest Airlines

One of Herb Kelleher's favorite stories is that back when they started flying to West Texas, the competitors tried to fight back by matching his fares. Herb's answer was to start offering a bottle of whiskey to every Southwest passenger. Within a few weeks, Southwest (ticker: LUV) became the largest liquor distributor in West Texas. Knowing the customers and not being afraid to take chances (or play jokes) became hallmarks at Southwest. At one point in 2002, domestic traffic at the nation's five largest airlines fell by 10 percent. At the same time, travel on the five biggest discount airlines increased by 11 percent. In 2002, the discounters accounted for 20 percent of U.S. passenger traffic (Trottman 2002). Within California, Southwest flew a whopping 63 percent of the passengers (Leonhardt and Maynard 2002).

To traditional airline executives, the amazing aspect of this change is that even businesspeople are flying on the discount airlines. Southwest pushed this concept hard for many years—emphasizing that a manager could get on the plane at the spur of the moment and fly to a business meeting at a reasonable fare. One executive, Brent Harris, managing director of Pacific Investment Management, notes that he now flies JetBlue for business instead of one of the big carriers for transcontinental flights. He observes that “While I could afford to pay more, there's a certain sense of satisfaction,” in getting the discounts (Trottman 2002). Southwest began adding transcontinental flights (from Baltimore) in 2002 (*The Wall Street Journal* 2002).

Southwest is an incredibly efficient airline, turning a plane around in as little as 20 minutes. Other airlines average 50 minutes. As a result, Southwest is able to fly its Boeing 737s an average of nine hours a day, compared with six hours for Delta and United (Trottman 2002). In general, the major airlines would have to cut 29 percent of their costs (\$18.6 billion) to match the cost structure of Southwest (McCartney 2002). In 2002, Southwest had become the nation's sixth largest airline.

Not all is rosy in the Southwest family. In 2004, Herb Kelleher had to step in to negotiate a new contract with the flight attendant's union. Normally, negotiations are friendly at the employee-centered company, but these took two years to settle. In the end, the workers gained an average 31 percent raise spread over six years (*The Wall Street Journal* 2004). In July, James F. Parker resigned as CEO.

In 2005, Southwest CEO Gary Kelly commented on the changing competition in the airline industry, “I think all carriers are low-fare carriers. To survive, all carriers are going to have to be at least lower-cost carriers.” In this new strategic environment, Southwest still wants to be the low-fare airline, and Mr. Kelly wants to use technology to reduce costs. One step was to shift more reservations onto the Web site, where costs run \$0.50 to \$1 versus \$10 or more for other methods. By focusing on airport operations, including customer service, the airline has been able to reduce costs by hiring fewer employees. In 2000, the airline employed 95 people per aircraft owned. By 2005, the number was down to 73 or 74 (Steinert-Threlkeld 2005).

In 2007, Southwest announced that it would slow its expansion, including a reduction in the number of new planes it will add. The airline also reduced some roundtrip flights in underperforming markets. The company was also planning to announce a new boarding/seating method at the end of 2007 (press release June 27, 2007). Ultimately, Southwest continues to expand. In 2011, Southwest took a big step by purchasing AirTran. The company expects the merger process to take a year, but AirTran dramatically expands Southwest's reach on the East coast (press release May 2, 2011).

One major change for Southwest was the increasing costs of fuel. According to the 2010 Annual Report, in 2005, when fuel was \$1.13 a gallon, fuel costs were 21.4 percent of operating expenses. In 2010 at \$2.51 a gallon, they were 32.6 percent of operating expenses. Industry-wide, the market crash of 2008 and 2009 also resulted in a drop in demand for flights, so all airlines struggled during the recession.

### *Information Technology*

Even in the early days, Southwest managed to avoid many of the hassles of reservation systems. For years, the company was able to list its flights for free on the industry reservation systems. It required travel agents to call the company to book the flight—the systems carried listings for free but charged when flights were booked. One estimate places the cost of booking through the Sabre system at \$12 to \$14 per transaction (Hoffman 2002). Today, Southwest has benefited considerably from the Internet. Customers can see all fares quickly and make their own reservations. Southwest gets over 40 percent of its bookings online, compared with United's 5 percent (Trottman 2002). The Internet also makes air fares more transparent. Even businesspeople can quickly see the difference in the prices across airlines. Using the online tools, travelers can arrange flights to avoid the huge fares that airlines are trying to hoist onto business fliers. David Weiner, corporate travel manager for DaimlerChrysler, explains that although the company has preferred discounts with Northwest, most of his managers would rather fly Southwest. He claims that “with companies like Southwest, their fares are affordable as is. It's not like you would require any additional discounts” (Leonhardt and Maynard 2002).

Southwest also pioneered business reservations on its Web site ([www.swabiz.com](http://www.swabiz.com)). In addition to letting managers and workers book flights, the system tracks companywide data for travel managers. Kaiser Permanente, a major health care organization, spends \$6 million on Southwest travel. The business site enables Margy Skinner, the travel manager, to identify all tickets and use them to obtain quarterly bulk rebates (Kontzer 2004).

The Web site is so critical to Southwest that it rebuilt the system in 2002. The new UNIX-based system uses servers from Fujitsu in a cluster to ensure that the system keeps running and can scale up. Steve Taylor, director of interactive marketing observes that “the bedrock of customer service in the online world is always being there. That's what we're aiming for with this clustering project” (Greenemeier 2002). The online marketing team consists of 70 employees, with 50 of them IT professionals and the rest marketing specialists.

Southwest does use information technology to help analyze its data. Since it does collect a large share of the transaction data directly, it has purchased business intelligence tools to help analyze it. In particular, the company is using Hyperion's Essbase OLAP application and budgeting software to make financial forecasts. Mike Van de Ven, vice president of financial planning and analysis at Southwest notes that after the September 11 attacks, the company knew it faced huge uncertainty and needed help. He adds that “we were asked to give some sort of financial insight for a variety of decisions the company might make” (Songini 2002). Before installing the \$1 million software, managers relied on writing custom database queries and evaluating the data in spreadsheets. Essbase provides immediate analysis and charts, cutting analysis time to as little as two minutes. Managers use the system to evaluate best and worst case scenarios to determine how to respond

to problems. The software paid for itself within the first year by providing more accurate forecasts and saving time for managers.

Unlike the other big airlines, Southwest is growing—that means it needs to hire more workers. Growth is good for both the company and the employees, but how can Southwest deal with the 200,000 resumes a year that it receives? Southwest is turning to Deploy software to handle the major tasks of hiring. The software tracks everything from job requests by departments, to application progress, and candidate matching and ranking. The tool also integrates with the U.S. government system for verifying job candidate fingerprints and validating drug-test results (Hayes 2003).

Radio systems in airlines are ancient. Even if the planes and radios are new, they use technology developed in World War II. As one of the few airlines making money, Southwest is one of the first to install a new digital technology (VDLM2) to transmit data between its dispatchers and aircraft captains. Because the technology is restricted to a portion of the VHF bandwidth allocated to airlines, it provides a data rate of 31.5 K bits/second. But that rate is 15 times the rate of the company's old system. The system primarily handles short text messages—often instructions on the best route around weather problems. Ultimately, the system will be used to transmit high-resolution weather radar images to the cockpit. The company is also planning to collect telemetry information on the plane's performance and route it to maintenance personnel at the next airport if problems are detected (Brewin 2004).

With high prices for fuel, airlines began focusing on methods to reduce flight distances and times. In 2007, several airlines, including Southwest, began implementing flight-planning software from Jeppesen. Jeppesen has long been known as a provider of flight maps and related technologies. In early trials, the system was able to reduce flight times on hundreds of flights from 4 to 7 minutes. A couple of minutes might not sound exciting, but do it enough times and an airline saves millions of dollars. EDS also sells flight-planning software to more than 40 airlines worldwide (Weiss 2007).

Because Southwest focuses on costs and profitability, it also tries to hold down spending on technology. Rarely is it the first adopter of a new technology—instead, it finds ways to get passengers from point A to point B as simply as possible. For instance, the flights do not assign seats and it was one of the last to print paper boarding passes. By 2005, the CEO reported that IT costs had flat-lined to about \$170 million per year, for equipment and wages. The company also applies its knowledge of operations to IT development. Mr. Kelly, the CEO noted that “we have a single data architecture. We have a standard testing approach, where we will rarely allow shortcuts” (Steinert-Threlkeld 2005).

In 2010, Southwest announced plans to implement a new reservations system (2010 Annual Report). The main goal was to be able to handle international flights, either with Southwest planes, or with a code share arrangement through another airline. Prior to this point, Southwest focused only on domestic flights and the reservation system was designed only for those flights. Yet, as Southwest grows, it feels it needs to be able to compete with the larger airlines who continually emphasize their international reach. In 2011, Southwest altered its frequent flyer program to be based on a point system instead of the number of trips. The points are based on dollar value of the tickets, presumably to reward business travelers who pay more money for flights than tourists. The new program required a complete rewrite of the software and Web site to support the changes.

In 2010, Southwest finished integrating the SAP ERP system which replaced the old general ledger, accounts payable, accounts receivable, payroll, benefits, cash management, and fixed asset management systems (2010 Annual Report). The new systems are integrated, providing managers with a comprehensive view of the accounting data.

### Questions

1. How does Southwest use information technology to establish fares?
2. How has Southwest used the Internet to gain at least a short-term competitive advantage?
3. Can Southwest maintain its competitive strengths as it continues to grow? What risks will the company face?

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## Case: Sabre

Sabre (ticker: TSG) is the monster real-time reservation system originally created by American Airlines. The first system went live in 1960 and handled 84,000 telephone calls a day. In 1964, the system ran on its own private network—reducing American Airline’s staff by 30 percent in the first year. In 1976, the system was installed into travel agent offices—quickly reaching 130 locations. In 1985, preceding the Internet adoption by several years, easySabre gave dial-up access to users with personal computers. In 2000, the company was spun off as a separate entity, but tracking-stock data is available back to 1996. In 2004, the system handled \$70 billion of travel products and connected 53,000 travel agents. It also forms the foundation of the Travelocity Web site ([www.sabretravelnetwork.com](http://www.sabretravelnetwork.com)).

### *Technology*

For years, the Sabre system ran on large IBM computers. Much of it was jointly developed with IBM, since the demands and technologies needed continually pushed the available hardware and software. The system handles 15,000 transactions per second and tracks 79 million air fares. In 2001, the company announced it would migrate the massive system to a completely new architecture—based on a UNIX platform (Anthes May 2004), but the transfer would take several years.

Throughout its history, Sabre has been a leading-edge system, handling huge transaction volumes and providing detailed data for analysis. Almost all of the code has been custom written. In 2000, Sabre produced Release 8 of its AirFlite Profit Manager. The modeling and forecasting package is used by airlines to estimate demand for seats on every flight. It is the core of the yield management system. Release 8 had about 500,000 lines of code. The problem is that it was four months late because final system testing turned up 300 bugs. The first customer found 26 more bugs in the first three days, and additional joint testing turned up another 200 defects. Sabre and its development team were embarrassed. However, the situation mirrored other development projects. The catch is that Sabre has 62 software products with 13 million lines of code. It cannot afford defect rates that high. For Release 10, shipped in December 2002, Sabre turned to extreme programming (XP). With XP, programmers work in pairs, but more important, they define testing procedures for each module before writing the code. The final version turned up only 100 defects after 16 months of use. At the same time, programmer productivity increased. The reduced defect rate also cut the number of support programmers needed (Anthes March 2004).

Partly from the increased competition, partly from the need to support new standards, Sabre moved in 2005 to replace its 15-year-old EDI system with Web services applications. Web services uses standards such as HTTP and XML to exchange data more easily with remote systems. The standards reduce the cost and the use of the Internet reduces the transmission costs and make it easier to develop applications that work together. Transferring data from airline systems onto Sabre’s system and ensuring timeliness and accuracy represent substantial costs for airlines (Havenstein 2005).

### *Competition*

Despite the technological advances and prowess of Sabre, it faces competition. Its biggest competition is undoubtedly the Internet. Although the company runs Travelocity, one of the big Internet travel sites, the site is not profitable yet. Furthermore, when customers book flights through Travelocity, the airline or hotel



pays a fee to Sabre. Consequently, airlines have been encouraging customers to book their flights directly at the airline Web sites—bypassing Sabre entirely. The Orbitz Web site was created by the five largest airlines specifically for that purpose. It searches the company's individual databases and routes the customer's choice directly to the airline's server.

In 2004, Alaska Airlines, tired of waiting for new services from Sabre, decided to create its own itinerary-planning and fare-searching system on a Linux-based system. Alaska simply purchased the system from Cambridge, Massachusetts ITA software. Steve Javris, vice president of e-commerce at Alaska, noted that “we couldn't wait on Sabre. ITA's algorithms are widely regarded as the best in the industry” (Verton 2004). Alaska will continue to use Sabre to book reservations, but will use the new system for data analysis. The ITA system is primarily used as the back-end processor for Web sites—helping customers identify routes. Jeremy Wertheimer, ITA's founder and CEO, comments that “it processes and confirms availability for [trip] pricing in less than one-tenth of a second” (Verton 2004).

But, Sabre is not standing still. The company is creating new tools to encourage airlines to continue using the system, and new products that will help travel agents. In terms of helping the airlines, Sabre launched its interline e-ticketing (IET) hub in 2004. Since Sabre serves multiple airlines, it is in an ideal position to provide links between them. Previously, customers had trouble booking e-tickets for flights that involved multiple airlines. Each system was separate and the airlines had to reidentify the passenger at each step. With the interline system, the passenger data and validation are shared across airlines. Essentially, Sabre serves as an EDI consolidator and translates data from each system into a common format that is accessible to all systems. The system is based on Web services, making it easy to expand and change as airline systems change (Rosencrance 2004).

Sabre also introduced a new feature for travel agents in 2004. What happens if a customer wants an aisle seat, but the only seat available is a middle seat? A good travel agent would book the available seat to keep it, and then periodically check the flight to see if a more desirable seat opens up. But that requires considerable time and effort by the travel agent. Sabre's answer was to create an event model that will alert the travel agent when a seat opens up. Loren Brown, CIO of Carlson Wagonlit Travel, a company with 8,000 agents, notes that agencies would likely pay extra for that feature alone, stating “that would be a much more elegant solution than we have in place now” (Kontzer June 2004).

Sabre also faces competition from more traditional rivals: Amadeus Global Travel Distribution, Cendant's Galileo International, and Worldspan. All of these were originally developed by other airlines and spun off as well. All of them are facing similar problems and working to cut costs and offer new services. That is one of the main reasons driving the switch in servers. Sabre estimates that by running the open-source MySQL database on open-source Linux servers, the new system will cost 80 percent less to operate (Kontzer June 2004).

Several startups offer new ways to search for flights, hotels, and cars. In 2006, ITA Software received \$100 million in venture capital funding. Its system drops processing costs to a couple of dollars a ticket, compared to the \$12 a ticket that airlines pay to Sabre for each reservation. ITA CEO Jeremy Wertheimer observed that “almost every ticket you buy is still being handled by assembler code running on a mainframe.” His systems use inexpensive x86 PC hardware running open source software (Kontzer 2006). Many airlines pass that cost onto customers, so savvy customers use the search systems (such as Sabre's Travelocity) to locate

the lowest-cost flights, and then book the flight directly with the airline—so Sabre gets paid only for the listing, not for the purchase.

Low-cost airlines have been particularly reluctant to book flights with Sabre. Southwest relied on its own system and Jet Blue dropped the Sabre listings when more customers began booking directly with the airline. AirTran bucked the trend in 2005 when it added all of its flights to the Sabre system (Kontzer 2005). By 2007, facing increased competition for low-fare flights, Southwest added its listings to Sabre and to the Galileo search system (Wall Street Journal 2007).

Experts have questioned how long the big reservation systems will compete with the startups. In 2005, Sabre took one step by purchasing European company Lastminute.com for slightly over \$1 billion. The site primarily gives Sabre access to the European market (Information Week 2005). Competitor Expedia had already purchased Hotels.com and Hotwire.com. Orbitz owns the Web site CheapTickets.

In 2008, Sabre added a social network component to its system (Havenstein 2008). The objective was to enable people to share advice and recommendations about their travel plans. It is not clear if anyone uses the system—particularly since anyone could use existing social networks instead.

### *The Future*

With so many competitive factors, it is difficult to guess who is going to win the battles for customer reservations. Sabre and its direct rivals have some amazing technology as well as the developers to build complex systems. One of the things that might be changing is that passengers will want to book package deals. But not quite like the old “here’s a tour—take it or leave it.” Instead, customers will want to go to a site and select their own custom bundle: pick low-cost air fares, choose hotels that offer the desired amenities at an acceptable price, then add in some adventure excursions. Yes, the big travel sites support these steps in a limited way now. However, they rarely allow anything more than limited customization. Ultimately, customers want a more intelligent system that can create desired bundles—at a discount. So, airlines, hotels, and other providers will need to cooperate. Then, the reservation sites will have to become sophisticated enough to balance the various choices and compute all of the package deals (Kontzer May 2004).

Sabre Holdings Corp. was purchased by private equity firms in March 2007 for \$4.5 billion, so it is no longer a public company (Fox News 2006). Operations are likely to continue as before. Private-equity firms went on buying sprees in 2006 and 2007, searching for companies with relatively low stock prices, that the investors believed could be used to generate solid cash flows.

In 2010 and 2011, the reservation industry faced several major challenges. First, the recession affected bookings so revenue was down. More importantly, the airlines began rebelling against the fees charged by the big sites (e.g., Travelocity and Orbitz). American Airlines went so far as to remove its listings from all of the major sites. Which was interesting because Travelocity (Sabre) was once a division of American Airlines. The goal at AA was to encourage customers to book flights directly at the company’s Web site, bypassing the fees charged by the ticketing sites. Southwest uses this technique to save money and AA managers wanted to do the same thing. Eventually, AA renegotiated with most of the systems, but passengers are well-advised to double check fares on individual airlines to get the best prices. Some sites, notably Kayak, automatically check fares through the big travel sites as well as the individual airlines.

Another interesting issue arose in 2010 when Google proposed to buy ITA Software (Perez 2010). ITA is a company that provides the airline data to many of the other travel sites, airlines, and Microsoft Bing. The company was founded in 1996 and has about 500 employees. Google wants to own the company so that it can integrate flight data and reservations directly into the Google search engine. But, other providers worry that this step would reduce competition, meaning take away their customers. Eventually, the Department of Justice approved the purchase but imposed a few conditions to encourage continued competition.

Despite the advances, travel search engines are still somewhat primitive. For starters, they rarely find the best prices. But, remember it is the airlines that pay the initial fees, so they have an incentive to arrange the systems to support their objectives. The flexible searches that check multiple departure dates and different airports do help users find better prices, but in the end, a human has to do a large amount of work to find the best fares and flight times.

### Questions

1. Who are Sabre's competitors?
2. What risks does the company face? Will travel agents continue to exist and will they use Sabre?
3. What factors are needed for an intelligent agent reservation system to be created? Who would create these elements?

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### Case: American Airlines

American Airlines (ticker: AA) is one of few original airlines still in existence. The company traces its history back to mail flights by Charles Lindbergh in 1926. By February 1937, American had carried one million passengers. At the start of 1959, American was the first to offer coast-to-coast jet service with the Boeing 707. In 1959 and 1960, American teamed up with IBM to develop and implement the SABRE (Semi-Automated Business Research Environment) system for handling reservations and business data. By 1964, the SABRE network extended across the U.S., Canada, and Mexico. American was proud to be at the leading edge of aerospace and information technology ([www.aa.com--history](http://www.aa.com--history)).

When the airline industry was deregulated in 1978, low-cost carriers arose across the nation—led by People Express in New Jersey. For four long years, the major carriers did not know how to compete. In 1985, American turned to the data held in the SABRE system to devise a winning strategy. Introducing Super Saver fares—for travelers who booked in advance and stayed over Saturday—American was able to compete dollar-for-dollar with the low-cost carriers. The secret was to hold back enough seats on each flight to sell at substantially higher rates for business travelers who booked at the last minute. The years of flight and passenger data held in the SABRE system enabled American to perform yield management to determine the optimum number of seats to hold back on each flight. In 1981, American Airlines started AAdvantage as the first frequent flier program. It was initially targeted to business travelers—to encourage loyalty (CNN Online 2006).

Over time, despite the various attempts by American and the other big carriers, competition changed the airline industry. The expansion of Southwest drove lower fares into new markets, which dramatically increased the number of passengers. Increasingly, American had to focus on cutting costs, and emphasizing its global access. But flights became commodities, where passengers simply want to get to their destination on time. But airlines cannot just throw in the towel and give up. In the 1980s, Bob Crandell, the CEO at American, thought about trying to become like Southwest Airlines, but realized it was not possible. Instead, the company focuses on using technology and creating systems to reduce costs and provide better service to customers (Rosencrance 2005).

In 2011, American began offering Samsung Galaxy Tab 1.0 devices to premium class passengers on its flights. The tablet is configured to provide in-flight entertainment and will allow passengers to browse the Web or check e-mail on flights with Wi-Fi installed (Hamblen 2011). Like the other carriers, American lost \$2.1 billion in 2008 and \$1.5 billion in 2009. But, unlike some of the others, American continued to suffer losses (\$0.5 billion) in 2010 (2010 Annual Report).

## *Technology*

Sabre drove American Airlines for 40 years, handling transactions and providing information about flights and crews. But, American became dependent on the system, and it was a system designed in the 1960s. When employees have new ideas, it can be difficult or impossible to reprogram Sabre to incorporate innovations. Captain Doug Pinion, scheduling chairman for the Allied Pilots Association at American, has had several ideas for saving money. For instance, he suggested back-up pilots could use the Web to bid on flights scheduled for the next day. But pilot's suggestions are overruled as too expensive, and American selects pilots based on seniority; phoning each person in turn. The problem is that the information system is too difficult to reprogram for new tasks. American's CIO in 2003, Monte Ford, said that all of the major airlines face the same issues. "In a lot of ways we're better advantaged because of the kinds of upgrades we've completed or are about to complete" (Gage 2003). Some operations have been moved onto Unix and Windows servers—pulling data from the Sabre transaction processing system. However, Ford believes that the mainframe system is still the best way to handle millions of transactions.

In many ways, the advent of the Internet accelerated the conversion of airline seats into commodities. Customers, tourists and businesses, can quickly and easily see the prices. Some Web sites, such as farecast.com, even track patterns for flights, and others can provide immediate notifications of any price changes. Henry Harteveltdt, a vice president at Forrester Research noted that "yield-management systems made it possible to have more fare types than seats on an airplane. But the airlines got greedy, and their bad pricing strategies caught up with them when the Internet exposed the pricing structures." The bottom line is that the established carriers have substantially higher operating costs than the discount carriers, as much as 7.2 cents per seat-mile (Rothfeder 2005).

Reducing costs will entail more than wringing additional concessions from labor, retiring old planes, and closing a few hubs. Even after exiting bankruptcy, Delta and United only reduced costs by small amounts. Ultimately, the big airlines like American will have to find a way to simplify operations and reduce the huge administrative costs. The micro-jets are waiting in the wings. Robert Crandall, ex-CEO of American Airlines, and Cameron Burr, son of Donald Burr, ex-CEO of People Express, have teamed up to start an executive taxi service called Pogo based on microjets (Meehan 2007). Depending on the progress of FAA certifications, operations were planned to start in 2008. For about the same price as business-class seats executives will be able to charter a flight that flies directly to the desired airport on any desired time schedule. The jets can fly into smaller, more convenient airports, and passengers will have no lines for security, check-in, or baggage. Ultimately, the jets could eat away at the passengers that yield-management relies on for profits.

American faced the same problems as every other airline during the recession. In an attempt to reduce costs, it tried to encourage passengers to book flights directly on its Web site and to send booking data directly to travel agents (2010 Annual Report). The company ran into contract-violation problems when it tried to remove its listings from the major ticketing agencies, and eventually relisted its flights on most of the systems (Cameron 2011). In 2011, American sued Orbitz and Travelport LP alleging anticompetitive practices. Overall, the company is focused on reducing costs.

### Questions

1. How can American compete with Southwest?
2. Is it possible to rebuild American's information system?
3. How can American compete with the coming microjets?

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### Summary Industry Questions

1. What information technologies have helped this industry?
2. Did the technologies provide a competitive advantage or were they quickly adopted by rivals?
3. Which technologies could this industry use that were developed in other sectors?
4. Is the level of competition increasing or decreasing in this industry? Is it dominated by a few firms, or are they fairly balanced?
5. What problems have been created from the use of information technology and how did the firms solve the problems?